NAVAL POSTGRADUATE SCHOOL
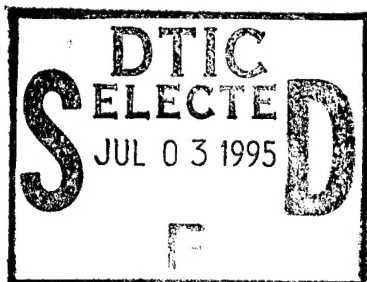## MONTEREY, CALIFORNIA

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THESIS

EFFECTS OF N-AFMET ON ENLISTED FIRST-TERM ATTRITION

by

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March, 1995

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ABSTRACT

This thesis focuses on the Navy-Air Force Medical Evaluation Test or N-AFMET, a three-phased, psychological screening program for new recruits, initiated by the Navy in fiscal 1992. Multivariate models are developed to estimate the effectiveness of N-AFMET in identifying a recruit's likelihood of failing to complete the first-term of enlistment due to a psychological disorder. The logit regression equations and probabilities are modeled as a function of the N-AFMET screening instruments and related demographic variables. Data were merged from two files held by the Defense Manpower Data Center: the Defense Cohort Accession Files for fiscal 1990, 1991, and 1992; and N-AFMET outcomes for recruits who entered the Navy in fiscal1992. The 1992 recruits were followed through September 1994 to analyze differences between those who remained in the Navy, those who were dismissed as a result of N-AFMET, and those who neither finished their enlistment nor were screened out by N-AFMET. The findings reveal that, in fiscal 1992, the N-AFMET screening program successfully identified a number of recruits who would have likely failed to finish their term of enlistment. However, a significant proportion of personnel identified as "Returned to Duty" continued to leave the Navy due to psychological problems. It is recommended that the 1992 recruits be tracked for an additional twelve months and that similar studies be undertaken to follow N-AFMET-screened recruits who entered the Navy in 1993 and 1994.

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I. INTRODUCTION

A. BACKGROUND

In Fiscal 1991, the Navy implemented a recruit psychological screening program called N-AFMET (Navy-Air Force Medical Evaluation Test). This program was initiated as a way to help curtail the persistently high rate of attrition among first-term enlistees in the Navy. Previous efforts to decrease first-term attrition rates revolved around two strategies: 1) the revision of policies and programs designed to retain recruits most likely to leave early; and 2) the refinement of enlistment screening and selection processes to identify preservice characteristics that distinguish recruits most likely to leave early. Specific measures taken to reduce attrition included updating literacy programs, implementing the so-called "Moment of Truth," revising the swim policy, aligning recruit physical fitness requirements with those of the fleet, and screening recruits with a strong likelihood of being discharged for a psychological disorder.

This thesis focuses on the Navy-Air Force Medical Evaluation Test (N-AFMET) as a strategy to reduce first-term attritions. The name is misleading as it implies that the screening is comprised of one "evaluation test," when in fact it involves three assessment instruments and a clinician interview in a three-phased process. The specific goals of N-AFMET are·two-fold: 1) Identify recruits who would attrite for dysfunctional behavior due to psychological disorders; and 2) Decrease fleet attrition due to psychological disorders.

N-AFMET is a three-phased screening process that includes: Phase 1) self-reports of life history variables; Phase 2) a preliminary mental health assessment based on a standardized personality inventory and a structured interview with a psychiatric technician; and Phase 3) a mental health evaluation by a psychologist or psychiatrist. The process commences on the first day of arrival at the Recruit Training Command (RTC). Phase 1 starts after the recruit has experienced a traumatic trip to the barber, changed into the basic recruit uniform, and endured the "Moment of Truth" lecture. Recruits progress on to the next phase only if they exceed designated cut-off scores or respond positively to

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specific items in Phase 1 and Phase 2. Final disposition, in the third phase, is based on the judgment of a licensed mental health professional. The three phases of N-AFMET are described in greater detail below:

Phase 1: History Opinion Inventory (HOI)

The History Opinion Inventory (HOI) is a self-reported, biographical history. It contains fifty true-false items representing eight categories: school and job adjustments; bodily complaints; emotional stability; response toward authority; antisocial behavior; family dysfunction; withdrawn behavior; and immaturity. Originally written as a 100-item pool designed for a study of Air Force recruits, LaChar and colleagues developed the items specifically to "reflect the assumption that the measurement of past behaviors and attitudes forms the best basis for prediction of future behaviors and attitudes" (LaChar, et al., 1974).

The HOI was adopted by the Air Force in 1970 as part of the Air Force Medical Evaluation Test (AFMET) to screen out recruits likely to be discharged from Basic Military Training (BMT). The instrument consists of two primary subscales: 1) the Emotional Instability scale; and 2) the Antisocial Behavior scale. The Emotional Instability scale consists of fourteen questions that indicate problems with controlling emotions. In a scale score of 0-14, a score in the low range indicates healthy or normal emotional responses. A score in the medium to high range of the scale indicates possible emotional instability problems and a need for further psychological analysis.

The Antisocial Behavior scale consists of twenty-one questions that indicate antisocial behavior. Similar to the Emotional Instability scale, a score in the low range of the 0-21 scale, indicates healthy or normal social behavior. A score in the medium to high range of the scale indicates possible antisocial behavior and a need for further psychological analysis. All other questions in the HOI, not included in the two subscales, represent reliability checks. These questions indicate whether a recruit is faking when answering the questions. A weighted total score of 0 to 30 is possible on the HOI, with higher scores indicating greater endorsement of problems prior to service. A recruit

whose score is in excess of the weighted score cut-off point of (.345) automatically proceeds on to Phase 2 for more in-depth screening. (Fiedler, 1991)

Fiedler (1991) conducted a study on the efficacy of the HOI used in the first phase of the AFMET program. In a sample of all Air Force enlisted personnel whose total active military service occurred from 1985 through 1989, she found that the recruits who graduated from BMT had significantly lower scores than those who were discharged. Correlation analysis showed that, for trainees who were selected for Phase 2 screening, graduation from BMT was significantly correlated to HOI scores ($r = -.36$, $p. < .01$). The Wherry-Gaylord Reliability for weighted subscales was .84 and Chronbach's alpha ranged between .65 and .7.

Overall, Fiedler found that "the HOI significantly distinguishes among those who do and do not graduate from basic military training, type of separation from the military, nonacademic favorable vs favorable technical school reports, eligibility for promotion, and ratings for promotions." (Fiedler, 1991) To increase predictive and clinical efficacy, the HOI was expanded in 1993 from fifty to seventy items (HOI-R), making it less biased against identifying female recruits with psychological problems.

Phase 2: NEO Personality Inventory (NEO-PI) and Structured Response Interview (SRI)

NEO-Personality Inventory (NEO-PI)

A recruit receiving a score on the HOI in excess of the cut-off point (.345) is referred to Phase 2 for more in-depth screening to determine if he or she should be seen by a clinician in Phase 3 of N-AFMET. The first part of Phase 2 consists of the NEO Personality Inventory (NEO-PI). It is a concise measure of the five major dimensions or domains of normal adult personality traits as defined by Costa and McCrae (1985): neuroticism (N), the tendency to experience emotional distress; extraversion (E), the disposition toward positive emotions, sociability and high levels of activity; openness (O), a receptive orientation toward varied experiences and ideas; conscientiousness (C), the tendency toward persistence, industriousness, and organization; and agreeableness (A), the

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inclination toward interpersonal trust and consideration of others. These five personality dimensions have been validated by a group of expert clinicians as sufficient to understand and describe normal adult subjects of any age. (Goldberg, 1993)

The NEO-Five-Factor Inventory (NEO-FFI), known more simply as "the NEO," is an abbreviated version of Form S of the NEO-PI, consisting of five 12-item scales that measure each of the above domains. This test offers both domain (dimensions presented as fundamental units) and facet (specific aspects within each domain) scores, making the NEO-PI applicable for defining the personality in both individuals and groups (Costa and McCrae, 1985). In studies performed by Costa and McCrae (1983a), scale reliabilities ranged from .66 to .92 for facets and .86 to .91 for domains.

Validity studies have been conducted comparing the NEO-PI with other forms of self-reports as well as personality assessments from external observers. Self-report comparisons include the Eysenck Personality Inventory or EPI (Eysenck & Eysenck, 1964), the Guilford-Zimmerman Temperament or GZTS (Guilford, Zimmerman & Guilford, 1976), and Tellegens' Differential Personality Questionnaire (Tellegen, 1982). Correlations from these comparisons, ranging from a low of .35 to a high of .84, have shown the NEO-PI to be a valid measure of the personality domains. (Costa & McCrae, 1985). Correlations with personality assessments based on external observer reports ranged from .45 to .72. According to Costa & McCrae, these findings indicate "NEO-PI scales show a consistent pattern of moderate-to-strong correlations with corresponding scales from other inventories and with ratings of the same traits made by different observers." (Costa & McCrae, 1985)

Studies by Vickers (1989, 1990, 1992) have validated the use of the NEO-PI with the population of Navy recruits. Personality traits were found to greatly influence the primary coping styles recruits relied on to survive the demands of BMT. When the NEO's five personality domains were correlated with the six coping categories, Vickers found statistical significance for the following five out of the six coping styles: problem solving (.44), positive reappraisal (.41), support seeking (.30), escape (.37) and self-blame

(.35). From the NEO's five domains, Neuroticism and Conscientiousness were the major contributors to the statistical significance of the coping styles. (Vickers, et al., 1989)

A second Vickers study focused on Navy Boot Camp recruits assigned to a special Medical Rehabilitation Program (MRP), to determine if psychological reactions to the onset of a medical problem contributed to the subsequent success or failure (attrition) in Boot Camp. The study correlated the NEO's five domains of personality with defined categories of coping, mood, and health status. Results showed that recruits with high scores on neuroticism, discomfort, dysfunction, and depression attrited at rates 187 percent to 255 percent higher than corresponding rates for low scorers on the same variables (Vickers, et al., 1992).

Additional research by Vickers, which correlates the personality domains of the NEO-PI with other health-relevant personality instruments, supports the hypothesis that the "explicit linkage of health-related constructs to basic dimensions of personality constitutes a significant step in the progression of health-related personality psychology" (Vickers, et al., 1992).

Scores from the HOI and the NEO are reviewed by a psychiatric technician in the second part of Phase 2. The following scores for men and women alert the technician to possible personality problems. Recruits are referred on to Phase 3 if their scores fall above or below the designated cut-off points listed below:

TRAITS	SCORES	
	MEN	WOMEN
Neuroticism (N)	30 & above	33 & above
Extraversion (E)	37 & above	38 & above
Agreeableness (A)	24 & below	26 & below
Conscientiousness (C)	24 & below	26 & below

Structured Report Interview (SRI)

The SRI is conducted in the second part of N-AFMET Phase 2 by a psychiatric technician. It is a structured interview to determine mental status, collating pertinent clinical information with the patient's prior psychosocial history. The interview covers the following nineteen behaviors:

Behavior	Definition
Somatic Concern	Concern over present bodily health.
Anxiety	Worry, fear, or over-concern for present or future.
Emotional Withdrawal	Lack of spontaneous interaction, even when talking about topics of interest.
Guilt Feelings	Over-concern or remorse for past behavior
Grandiosity	Exaggerated self-opinion, conviction of unusual ability or powers
Depressive Mood	Despondency in mood or sadness
Hostility	Animosity, contempt, belligerence, or disdain for other people outside the interview
Suspiciousness	Belief (delusional or otherwise) that others have now, or have had in the past, malicious or discriminatory intent toward the patient

Hallucinatory Behavior	Can vary from misinterpretations or distortion of a real external sensory experience to sensory perceptions in the absence of real stimulation occurring during the waking state (hallucinations)
Blunted Inappropriate Affect	Lack of emotional reaction to the interview or interviewer, (e.g., monotonous voice, poker face). Reduced emotional tone or apparent lack of normal feeling of involvement. Emotional expressions with minimal or marked indifference and apathy. Affect may not fit the situation or the content of speech.
Alcohol	Excessive use of alcohol, causing physical symptoms, alterations in mood or behavior, or interference with daily routine or personal relationships.
Drugs	Excessive use of medications (prescribed or unprescribed) or drugs (legal or illegal) to the extent of causing physical symptoms, alterations in mood or behavior, or interference with daily routine or personal relationships.
Antisocial	Behavior or attitudes that transgress or ignore social sanctions, norms, and expectancies, or legal codes
Legal Difficulties	Behavior can vary from no legal difficulties, traffic tickets, felony convictions to several terms in prison.

Irrational Fears	Irrational fear of a specific object or situation (e.g., fear of crowds, heights).
Physical Abuse	Victimized by behaviors that transgress or ignore social sanctions, norms, or legal codes regarding (1) discipline or (2) childhood/adolescent interaction.
Sexual Abuse	Victimized sexually with or without additional physical violence.
Emotional Illness	Age of person and severity of interval situation at time of mental health intervention should be taken into account in determining severity.
Suicide	Ranging from no intent or plan to plan with ability to implement.

Recruits progress to Phase 3 if they meet any of the following criteria:

- One Severe/Profound rating on any of the above SRI items

- Two or more moderate ratings on above SRI items

- NEO scores = N, E, C with two or more in specified ranges
                            A and C = both in range

- Answer of "True" to Critical HOI items

- Use of any medication for psychiatric illness after the age of ten

<u>Phase 3: Interview by a Navy Clinical Psychologist or Psychiatrist</u>

This interview is an in-depth mental health evaluation performed by a clinical Psychologist or Psychiatrist to confirm or rule out the presence of psychological pathology. The <u>Diagnostic and Statistical Manual (DSM-IV)</u> criteria serve as a guide for this evaluation. DSM-IV provides a categorical classification that divides mental disorders into specific types based on criteria sets with defining features. However, for a clinician to assign a specific mental disorder diagnosis (e.g., personality disorder) the person has to possess only a few of the defining features (e.g., Borderline Personality Disorder requires only five out of the nine listed characteristics). (DSM-IV, 1994)

Phase 3 culminates in the assignment of one of the following disposition codes that designates a specific diagnosis and/or follow-on action (from the N-AFMET Instruction):

- Return to duty (no further response required).

- Trial of duty (with an appointment for recall at a specified calendar date for further evaluation).

- Recommendation to the Commanding Officer for administrative separation on the basis of a psychiatric diagnosis:

    - LSX = Alcohol/Drug dependent.

    - PTSD = Post-traumatic Stress Disorder (Male or Female).

    - Hospitalize immediately.

    - Severe Personality Disorder - separate from service immediately. Personality disorder diagnoses are coded as the primary code if the recruit has concurrent diagnoses.

    - Severe Adjustment Disorder - separate from service immediately.

    - Other = non N-AFMET attrite.

- GEY = Psychological (Pre-Service).

- GFE = Suicide Behaviors.

B. STUDY OBJECTIVE

This thesis focuses on N-AFMET and its impact on Navy first-term enlisted attrition. It is hypothesized here that the use of N-AFMET correlates positively with a reduction of this attrition; and, further, that attrition due to psychological conditions can be reduced both in training and in the fleet as a result of N-AFMET. Through closer examination of two populations -- recruits who succeed and recruits who fail to complete their first-term of enlistment -- it is hoped that this research will enable N-AFMET to function more efficiently.

C. SCOPE, LIMITATIONS, AND ASSUMPTIONS OF THE STUDY

N-AFMET was initiated at the three Regional Training Centers (RTCs) -- Great Lakes, San Diego, and Orlando -- in October 1991. N-AFMET data are currently available for analysis from October 1991 through September 1992. However, the input of N-AFMET data during this time was periodic, as the three RTCs responded to the impact of downsizing initiatives. San Diego and Great Lakes were phased down in fiscal 1992, with Great Lakes resuming processing of recruits in January 1992 and San Diego in April 1992. Subsequently, San Diego and Orlando have been closed permanently.

Each RTC services a unique recruit population. The follow-on technical schools that are collocated with the RTCs differ according to ratings. Thus, the recruit populations differ with respect to demographic characteristics, cognitive abilities, expectations, and personalities. Until fiscal 1995, women were trained only at RTC Orlando, at which time downsizing initiatives moved women's training to RTC Great Lakes.

Personnel in this data base have first-term obligations that range from three to eight years. However, this thesis will restricts the data to non-prior service recruits who

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have a four-year obligation (also called "four-year obligors") since they represent the largest group of homogeneous personnel. In addition, all personnel with an Interservice Separation Code indicating an Expired Term of Service are deleted from the sample.

Statistical analysis codes attrition as a "dummy" variable, assigning a 1 if the individual continues to remain on active duty, and a 0 if attrition occurs at any point prior to completing the four-year obligation. Although the data do not allow tracking of 1992 recruits through the entire four-year obligation period (the 48-month demarcation point for the full group falls in September 1995), personnel can be tracked up to thirty-six months. To add consistency to the comparison of the cohorts from 1990, 1991, and 1992, the cut-off point for attrition is limited to thirty-six months.

D. ORGANIZATION OF THE STUDY

This thesis is organized into five chapters. The introduction and background are contained in Chapter I, while Chapter II reviews pertinent studies that relate to the area of research, but do not necessarily address the topic in its entirety. Chapter III describes the contents of the various data files that were utilized in this study and provides a detailed explanation of the research methodologies employed in the models. Chapter IV presents the empirical results of the analysis. Chapter V summarizes conclusions based on the results. Finally, the thesis develops recommendations for improvement of the N-AFMET process and policies regarding its continued utilization. It also raises several issues that warrant further research.

II. LITERATURE REVIEW

Military personnel have served as the subject of many attrition studies over the years. Persons who enlist in the military are relatively young -- just nineteen years old on average -- coming right out of high school with little or no job experience. Unlike employment in the civilian work force, military enlistees incur a contractual obligation to serve that can only be broken "officially" by the employer. However, the enlistee has great influence over whether or not this contract is successfully completed by his or her ability to adjust and conform to the demands and restrictions of the military lifestyle.

A broken contract represents a significant loss of invested time and money for both the military and the enlistee. In an effort to decrease these losses, researchers have focused on screening instruments that use different sets of variables to predict who will, or will not, be successful in completing the enlistment obligation. Certain psychological and demographic variables have been found to work well in predicting the probability of attrition. However, as recruit characteristics change over time, so do the variables that researchers focus on. Substance abuse, stress, and criminal behavior are a few of the variables that have been found to contribute to the attrition behavior in the 1990s.

The following is a review of selected research on attrition from the Army, Navy, and Air Force. These research studies detail the various screening instruments that have been developed to stem attrition. Significant findings and implications of each study are presented.

The beginnings of enlistment screening can be traced back to the early 1900s, when large numbers of men were drafted to operate the sophisticated weaponry developed to win World War I (Segal and Sinaiko, 1986; Eitelberg, 1988). Army officials were very concerned how these temporary civilian soldiers would respond to compulsory military service and the rigors of trench warfare. Plans presented by Walter Scott, representing a group of civilian psychologists, offered a way to classify recruits by occupational skill. Although the Army never fully implemented the plan (since as Scott lingered too long in

perfecting the process), the military and psychology had sown the seeds for a very fruitful relationship. (Keene, 1994)

Psychologist Robert Yerkes expanded on Scott's theory that job success is related to recruit abilities by introducing a classification system based on mass intelligence testing. This psychological screening project proved very successful in 1917. As Keene (1994) notes, it helped to "purge incompetent soldiers from the ranks." It also represents the military's first successful test and evaluation of psychological methods. (Driskell and Olmstead, 1989)

With the start of World War II, the Army once again turned to psychologists for a way to classify or sort out the rapidly expanding influx of new troops. In 1940, the Committee on Classification of Military Personnel developed the Army General Classification Test (AGCT) to replace the Alpha and Beta tests of World War I. The AGCT was eventually used to classify over 9 million inductees. The AGCT served as a prototype for many future aptitude tests, including the Armed Forces Qualification Test (AFQT), which was introduced for screening in 1950, and portions of the Armed Services Vocational Aptitude Battery (ASVAB), established as the DoD-wide enlistment exam in 1976.

Induction screening progressed even further with research by Danielson and Clark (1954) who tested a screening instrument designed to detect recruits who had, or were likely to manifest, psychiatric disability of sufficient severity to preclude Army service. Based on the belief that unsuitability to military service could be hastened by the stress of Basic Military Training (BMT), the personality screening inventory was visualized as a screening adjunct that would eliminate unsuitable men before they would ever see actual combat.

The personality screening inventory was administered to new recruits in the Navy within the first two days of entry into BMT. The inventory covered four main areas of psychological development: delinquency, maladjustment, psychotic tendencies, and femininity. Based on their scores, recruits were divided into groups, ranging from

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"severely emotionally disturbed" (S4) to "recommended for leadership training" (Leaders). However, no one was separated from the Army as a result of the testing.

The inventory consistently predicted attrition for the severely emotionally disturbed group at a rate of more than 50 percent. In addition, the test had face validity. It was short, readily understood, quickly scored, and easily interpreted. This work ultimately contributed to the credibility and development of psychiatric screening inventories.

A study by John Plag (1957) during the same period examined a widely held assumption that the peacetime recruit possessed different characteristics and motivations than the wartime recruit. His research was a reaction to increases in the number of unsuitability discharges during Navy recruit training. The overall goal was to define psychological pre-enlistment adjustment and performance variables that would best predict this unsuitability.

Approximately twenty thousand recruits were given a psychological questionnaire when they arrived at BMT. Four measures of performance and adjustment were used: discharge due to unsuitability, military performance, classroom performance, and assignment to a special company. Seven areas of psychological development and performance were found to yield positive reliability correlations, ranging from .85 to .96. They were: non-conforming behavior, bodily complaints and preoccupation, authority-figure relationships, motivation, pre-service achievements, emotional instability and maturity, and work attitudes and goals. The areas pertaining to educational level and chronological age showed significance in both validation and cross-validation samples (Plag, 1957). This study updated psychological screening criteria from World War II and laid the groundwork for the future use of age and educational characteristics in enlistment standards.

Air Force studies that employed psychological screening tools during this period include research by Jensen (1961) and Lachar (1972). Jensen's research employed a psychological questionnaire to profile mental pathology, from which clinicians would predict recruit BMT success or failure. According to Jensen, the questionnaire enabled the clinicians to make predictions with "a fairly high, though not entirely satisfactory,

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degree of accuracy" (Jensen, 1961). Surprisingly, mental pathology was found to be only a minor cause of failure. Instead, Jensen found that "immaturity, lack of motivation, and personal and social habits and the social order of the military itself probably account for 95 percent of the failure of the 5 percent or so who are not successful." (Jensen, 1961)

Airmen who were successful in BMT were found to have fewer health complaints, showing significant improvement in self-confidence and satisfaction with self and communal life. These results led Jensen (1961) to conclude that, "if only those already suitable for military life are to be successful in the military, then only they should be accepted. . . . Appropriate pre-induction evaluation would go far toward accomplishing this." This research contributed greatly to establishing the need for psychological screening tools.

Lachar (1972) continued to study the predictive ability of psychological screening inventories and BMT adjustment using the HOI and the PSI. Primarily, he wanted to test the "ability of the two item pools to discriminate normals from recruits who would subsequently display signs of emotional disturbance or admit to prior drug usage . . . ." (Lachar, 1972)

The tailor-made inventory items of the HOI were found to discriminate better than those taken from the general purpose inventory, the PSI. Items that best predicted the probability of emotional adaption and success in military basic training included the following: previous adjustment to high school, authority figures and societal limits, past social and emotional adjustments, and current motivation for success in the military. Items that indicated poor adjustment included separations due to previous drug usage and psychiatric or medical disability.

Predictive scales from both the HOI and the PSI were combined into an Adaptation Index that identified 12 percent of the recruits as "high risk," with a 50 percent split between predictive failures or separations and false positives. The researchers pointed out that three factors should be considered when determining the value of a psychiatric screening program: 1) total screening program cost; 2) potential cost savings of avoiding the training and treatment expenses of identified recruits who will

separate prematurely; and 3) loss of potentially productive recruits as false positives. (Lachar, 1972)

Two studies by Plag investigating first-term enlistment (1966) and related dimensions of psychiatric illness (1970) contributed greatly to the early research on psychological screening. The first of these studies was a reaction to claims that psychiatric clinicians were improperly identifying sailors who had adjustment problems. Despite the utilization of psychiatric selection procedures, mental and personality disorders continued to be the leading causes of early discharge from Naval service.

Plag (1970) examined twenty variables in multivariate regression analysis for predictive ability of military effectiveness (completion of first-term enlistment with reenlistment recommendation) and non-effectiveness (early separation or completion with no recommendation). The five characteristics that were found to give the best prediction (r=.38) were: level of schooling, family stability, number of expulsions from school, Arithmetic Test score, and Mechanical Test score. He concluded that classification of recruits as psychiatric suspects could be better accomplished using a table of effectiveness probabilities as opposed to relying on clinical judgments.

The second study by Plag (1970) examined an area of service adaptation not reflected in the above criterion of military effectiveness: namely, the interrelation of psychiatric illness and military effectiveness among first-term enlistees. According to Plag, this came from the belief that "it should be the goal of any military selection system not only to enlist those applicants with a high probability for effective performance, but to reject applicants who have a high likelihood of incurring disciplinary action or of becoming medically incapacitated." (Plag, 1970)

This study represented the first longitudinal investigation of mental illness conducted in the Navy for a sizable population at risk. A major finding was a high relationship between psychiatric illness and military ineffectiveness. In addition, caring for enlistees with psychiatric disorders was found to be much more costly than previously reported. The two variables that best predicted military effectiveness in the first study,

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years of schooling completed and AFQT scores, also had the highest correlations with the criterion of psychiatric sick-list admission. (Plag, 1970)

These findings suggested that adoption of a selection system using characteristics that predicted general military effectiveness would also decrease the number of enlistees with a high potential for psychological problems. These studies helped to lay the foundation for developing a single psychological screening program.

Successful prediction of unsuitability and emotional instability continue to be an important area of study in the military. Additionally, the Services in the current environment are experiencing problems with alcohol and drug use, stress in the workplace and family-unit often resulting in physical abuse cases, and theft or other criminal behavior that indicate problems of unreliability in the work force.

Hogan and Hogan (1989) specifically addressed these more recent problems of antisocial behavior in a study on employee reliability/unreliability. Workplace deviancy that includes the counterproductive acts of theft, drug and alcohol abuse, lying, insubordination, vandalism, sabotage, absenteeism, and assaultive actions is defined here as a larger syndrome called "organizational delinquency." Specifically, their research used the Hogan Personality Inventory or HPI (Hogan, 1983, 1986) to test four different groups of people (prisoners, nurses aides, police cadets, and college students) for significant relationships that existed between personality characteristics and delinquent behavior.

Inventory scores from the following six individual scales were combined to form one employee reliability scale: Intellectance (school success); Adjustment (not depressed, no guilt); Prudence (avoids trouble, good sense of attachment, not experience-seeking); Ambition; Sociability (enjoys crowds, exhibitionistic); and Likability (easy to live with). Results showed that scores at the low end of the scale correlated well with undesirable work behaviors while scores at the high end matched commendable behaviors. (Hogan and Hogan, 1989)

When this scale was correlated with scales from other standard inventories such as the California Psychological Inventory (CPI); Minnesota Multiphasic Personality Inventory (MMPI), Self-Directed Search (SDS), and Armed Services Vocational Apptitude

Battery (ASVAB), individuals with low scores on the employee reliability scale were found to possess the predicted characteristics of aggressiveness, hostility, self-indulgence, impulsivity, and insensitivity. Persons with high scores were more mature, thoughtful, responsible, and somewhat more inhibited.

Early indentification and discharge of recruits who possess the undesirable characteristics noted at the low end of the scale can save the Navy substantial direct and indirect costs. These are the people who "manage to avoid becoming involved with the legal system and, therefore, are not identified as delinquent . . . [even though] they are the people who cause most of the problems in organizations." (Hogan and Hogan, 1989)

A more recent study by Flyer (1993) revealed that alcohol and drug abuse, assaultive behaviors, and larceny were the most common inservice offenses of Army enlistees. Recruits charged with these offenses, often at the trainee-entry level, adversely influenced unit effectiveness and troop morale. As in the study by Hogan and Hogan (1989), Flyer found that "undesirable behavior during military service does not necessarily result in unsuitability discharge . . . [therefore] it may well be that the most effective way to reduce inservice crime is to better identify and screen for preservice criminal behavior during the enlistment process." (Flyer, 1993)

As the services come to realize the consequences and high cost of organizational delinquency in the work force, it becomes imperative to research the underlying causes. The overall extent of delinquency in the workforce must first be determined, ultimately seeking screening instruments that can identify the characteristics of unreliability.

Orvis and Purvis (1979) conducted a study of alcohol use and related consequences among Air Force enlisted personnel to verify the claim that increased disciplinary problems were related to high levels of alcohol consumption. They found that alcohol use was more concentrated among the younger, more junior, male service members, constituting a public health problem of substantial proportions that ranged from intoxication on isolated occasions to chronic dependence on alcohol. According to Orvis and Purvis (1979), "the consequences are potentially very serious, not only because of their effects on those involved, but also because of the magnitude of the costs to society."

The majority of these costs were found to be associated with health care, lost production, and motor vehicle accidents.

The great majority of personnel with alcohol problems also suffered from serious impairment of work, poor health, or family troubles that often resulted in police interdiction. Drinking levels of these young military men placed in the range commonly found in alcoholic populations, with a typical rate of alcohol consumption that was eight times greater than the norm. Alcohol-related loss in working time was found to be 27 times the norm.

Alcoholism extends beyond the alcoholic, however, and eventually becomes a family problem as well. In a recent study by Adams and Overholser (1994), the relationship between the substance abuse of a family member and suicide was investigated. Results showed that alcohol and drug abuse occurred more frequently in suicidal patients. In addition, a family history of alcohol abuse was reported more often by suicidal than nonsuicidal patients. Depression (or hopelessness) was often found to be the intervening variable between alcohol abuse and suicide. Suicidal behavior was also found to be related to the abuse of drugs other than alcohol when combined with high levels of stress. (Adams and Overholser, 1994)

This information adds validity to the items chosen in N-AFMET. The military life-style naturally creates stress due to the nature of its unique demands, ranging from BMT to long deployments or assignments away from home to combat. This stress can accentuate coping mechanisms already being used. A recent study by Hildebrandt (1994) revealed that Naval enlisted personnel were affected by stress at work to a greater degree than their counterparts in other military services. Statistical analyses showed that stress and non-belief in the harmfulness of drugs contribute most to positive drug use by this population. According to "The Worldwide Survey of Substance Abuse and Health Behaviors Among Military Personnel" (1992), almost 10 percent of enlisted personnel who reported a "great deal" of stress used drugs as a coping mechanism. This compares with 3.0 percent of enlisted personnel who claimed to feel no stress.

The costs of drug abuse and alcoholism, though difficult to measure directly, are far-reaching and insidious. The "Drug and Alcohol Use" report, based on the 1988 Worldwide Survey, found that, in general,

> . . .drug-abusing employees are late three times as often as non-abusing employees, request early dismissal or time off more than twice as often, have more than two times as many absences of eight days or more, use 3 times the normal level of sick benefits, are 5 times more likely to file a worker's compensation claim, and are involved in accidents almost four times more often. (Crouch, et al., 1990)

In addition, the study found that decreased military readiness could be attributed to drug and alcohol use by personnel who experienced lower reaction times and less visual acuity.

Clearly, drug and alcohol abuse can exact a severe and costly toll on the organization's mission and operation, and it can also affect "morale, family ties, interpersonal relations, mental and physical health, and esprit de corps," according to a study of non-rated Navy personnel (Matthies, 1987). In 1981, the Navy adopted a "zero tolerance" policy toward drug abuse in endorsing the belief that "drug and alcohol abuse is incompatible with the maintenance of high standards of performance, military discipline, and readiness, and is destructive of Navy efforts to instill pride and promote professionalism." (Hildebrandt on Lieb 1986)

As the above studies show, the Navy has come to recognize the high costs of employing personnel that suffer from "organizational delinquency." The Navy has been working to reduce these costs--monetory as well as in terms of unit effectiveness or readiness--by stemming increasingly higher first-term attrition rates. Attrition studies in the 1980s and the 1990s, published by the Center for Naval Analyses (CNA) and Rand Corporation, have concentrated on analyzing trends and patterns to identify recruit characteristics that are correlated with attrition.

Studies by Buddin (1984, 1988), Cooke and Quester (1989) and Hosek, et al., (1989) have continued to corroborate Flyer's earlier discovery (1956) that cognitive ability or education level (especially high school graduation) is strongly correlated with attrition.

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The Navy, as well as the other services, has responded to these statistical analyses in recent years by targeting recruiting efforts on "high-quality" applicants -- or high school graduates with AFQT scores in the upper 50th percentile -- in an effort to decrease attrition rates and bolster force effectiveness. (Eitelberg, 1988)

Although the Navy has been very successful in increasing the numbers of these "high-quality" young people over the years, attrition rates did not respond accordingly. Buddin (1989) found that "a sharp improvement in recruit quality in the early 1980s was in fact associated with a rise in 6-month attrition losses and only a modest reduction in 36-month losses for both men and women." The additional discovery that different quality cohorts had very similar levels of attrition led him to conclude that "individual cohorts have some unique characteristics over and above their quality composition that have an important bearing on cohort attrition levels." (Buddin, 1989)

Buddin's study also looked at the characteristic of age in the attrition equation. While younger recruits (seventeen years old) were less likely to separate from service during the initial BMT period, they were also less likely to complete their enlistment contract. Early attrition rose by 2 percentage points per year as enlistment age increased beyond seventeen. In addition, attrition probabilities rose with the number of months since completing one's education. This finding has strong implications for future years as "the median age of enlisted personnel has been steadily increasing at a rate of about one year per decade -- from twenty-two in 1972 to twenty-three in 1982 to twenty-four [in 1990]" (Eitelberg, 1991).

A "career" in the military in the 1990s becomes more attractive and competitive as the services recruit older, more highly educated personnel. This increased image also contributes to a rise in the numbers of married personnel and single parents joining the military for the first time (Eitelberg, 1991; Scowcroft, 1982). Cymrot (1986) found, in his study of Academy students, that "those married at accession have a lower survival probability."

Cooke and Quester (1992) found that recruits from minority groups, particularly blacks and Hispanics, were more likely to complete their first enlistment terms. The

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proportion of Hispanics in the military population reached an unprecedented high in 1992 of about 5 percent (Eitelberg, 1993). Another minority group in the military that has increased proportionally over the years is that of women, growing from less than 2 percent in 1973 to 11 percent in 1992. Buddin (1989) found that, although the numbers and "quality" (AFQT scores and high school graduation status) of women have increased, their attrition rates have not necessarily decreased. Overall, women age twenty-one or older experience above-average BMT attrition, with post-training attrition rates higher for white women than for black women.

Research by Klein (1991) looked to see if the reasons for early separation/attrition were related to recruit characteristics. The major reasons for separation included problems with mental health, training, work/duty, alcohol and drugs, major and minor legal offenses, homosexuality, pregnancy, and physical fitness failures. Results showed that women tended to experience mental health problems to a greater extent than men, whereas men were more likely to have problems with alcohol, drugs, and legal offenses. Mental health problems tended to decrease during the first term, while problems with alcohol, drugs, and legal offenses increased with time. Overall, compared with other services, the Navy was more likely to have separations involving drug problems.

Idar and Scaramozzino (1992) conducted research on the early results of the N-AFMET initiative to determine the extent of psychological disorders among newly accessed enlisted personnel. The authors found that the three-phased psychological screening program worked to "ensure an equitable, quantifiable and consistent manner in early identification of those recruits most at risk for attrition as a result of a psychological condition." (Idar and Scaramozzino, 1992)

Over seven hundred sailors (1.2 percent of the total recruit population) were screened and discharged as a result of N-AFMET from its introduction in October 1991 through September 1992. Approximately 36 percent of these separated recruits were found to have some variation of an alcohol or drug-related diagnosis. In May of 1992, the HOI expanded from fifty to seventy items in an effort to strengthen the instrument's ability to identify female recruits with psychological problems.

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With N-AFMET, the Navy should continue to see initial increases in cohort attrition as recruits with psychological disorders are identified and separated. Later months, however, should reveal decreased attrition attributed to medical reasons, drug and alcohol abuse, and misconduct. At the same time, recruits in BMT are expected to experience an increase in morale and unit cohesion as a result of separating N-AFMET-identified recruits. Finally, the Navy should eventually benefit from N-AFMET with "a cost avoidance of thousands of dollars as manifested in reduced safety accidents, reported alcohol/drug related incidents, suicide gestures, domestic violence, legal actions and management's time in attending to disruptive behavior." (Idar and Scaramozzino, 1992)

III. DATA AND METHODOLOGY

A. DATA

Two sources of data were used in this statistical analysis of enlisted first-term attrition. The first source of data was enlisted personnel data files. These were obtained from the Defense Manpower Data Center (DMDC) in Monterey, California. The second source of data was N-AFMET files, also obtained from DMDC.

Three DMDC Special Cohort Accession & Continuer (DSCAC) files were obtained for enlisted recruits who entered the Navy in 1990, 1991, and 1992. These files track the careers of active duty enlisted personnel in a given "cohort," where "cohort" is defined as all enlisted personnel who entered active duty in a given fiscal year. There is a large amount of demographic background information available in these files as well as personnel loss actions that have been updated through September 1994.

Data from the three cohort files were restricted to the following criteria: no prior military service; four-year obligors only; and all observations with separation codes indicating "Expired Term of Service" deleted. The final number of observations in each cohort data set were:

Cohort	Observations (Number)
1990	57,718
1991	42,145
1992	36,343

Previous attrition studies (Buddin, 1984, 1989; Antel, et al., 1987) employed demographic variables to predict the probability of first-term attrition/non-attrition by enlisted personnel. As pointed out in Chapter II, certain variables pertaining to ability and level of education revealed the highest significance for attrition behavior. Specifically, attaining a high school diploma and a score in the upper 50th percentile on the AFQT

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indicated a high probability of success in finishing one's first term of enlistment. These two characteristics, combined, indicated a "high-quality recruit." (Buddin, 1989)

Additionally, the variables race, gender, age, marital status, and number of dependents have been found to correlate with attrition behavior (Buddin, 1984, 1989; Hosek, 1991; Cooke and Quester, 1992). For example, women have been found to have greater attrition at an older age, while blacks and Hispanics complete their obligations more often. The overall probability of attrition has been found to increase with age, marital status, and number of dependents. Based on the above research, several variables were selected for inclusion in the present study. These variables are shown in Table I.

**Table I. Variables and Corresponding Definitions from DSCAC,
Fiscal 1992 Cohort**

VARIABLE	DEFINITION
OBSERVATION	Social Security Number
RACE/ETHNICITY	White Black Asian Hispanic
EDUCATION	Non-High School Diploma High School Diploma Alternative HS Credential (GED, Home Study...) Some College: Post-High School Education (1 year College +)
AFQT CATEGORY	I (AFQT score 93-99) II (AFQT score 65-92) IIIA (AFQT score 50-64) IIIB (AFQT score 31-49)
AGE (YEARS)	Youth (17) Midage (18 and 19) Mature (20) Senior (21 thru 35)
GENDER	Men, Women
MARITAL STATUS	Single, Married

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DEPENDENTS	0, 1, 2 or 3 dependents
TIME OF SERVICE (months)	0 - 3 4 - 12 13 - 24 25 - 36 37 - 48 (Fiscal 1990, 1991)
Interservice Separation Codes (ISCs)	Ranging from #002 - #102 (Table II)
Separation Action Codes	Attrition codes only (Table III)

Source: Derived from data obtained from Defense Manpower Data Center.

Loss actions in the DSCAC files are recorded as Interservice Separation Codes (ISCs), as defined by the Department of Defense. These codes indicate the primary reason a service member is discharged or separated from the military. If Navy personnel separate during training, they are given an additional code, a Separation Action Code (SAC), as defined by the Chief of Naval Education and Training (CNET). These codes are specific to the Navy, used within the training arena only, and are not found in the DSCAC files. To better relate the ISCs found in the DSCAC files to the SACs (Table III) that appear in the N-AFMET files, the ISCs have been grouped into the same general categories. Table II outlines the major categories and ISCs defined from 1990, 1991, and 1992 cohorts.

Table II. Interservice Separation Codes (ISCs) and Related Separation Action Code (SAC) Categories

SAC CATEGORY & ISC

ADMINISTRATION/MOTIVATION
61 = Motivational Problems
63 = Inaptitude
66 = Shirking
68 = Financial Irresponsibility
69 = Lack of Dependent Support
70 = Unsanitary Problems
82 = Unsuitability (Reason Unknown)
86 = Expeditious Discharge/Unsatisfactory Performance

MEDICAL DISQUALIFICATIONS
10 = Conditions Existing Prior to Service
11 = Disability - Severance Pay
12 = Permanent Disability - Retired
13 = Temporary Disability - Retired
14 = Disability - Non EPTS - No Severance Pay
15 = Disability - Title 10 Retirement
16 = Unqualified for Active Duty - Other

LEGAL
65 = Discreditable Incidents - Civilian or Military
71 = Civil Court Conviction
72 = Security
73 = Court Martial
75 = AWOL, Desertion
76 = Homosexuality
77 = Sexual Perversion
80 = Misconduct (Reason Unknown)
83 = Pattern of Minor Disciplinary Infractions
84 = Commission of a Serious Offense

DEATH
30 = Battle Casualty
31 = Non-Battle - Disease

PHYSICAL
81 = Unfitness (Reason Unknown)
17 = Failure to Meet Weight/Body Fat Standards
32 = Non-Battle - Other cause of Death
33 = Death - Cause Not Specified

FRAUD
64 = Alcoholism
67 = Drugs
74 = Fraudulent Entry

CONVENIENCE OF GOVERNMENT
78 = Good of the Service (In Lieu of Court-Martial)
79 = Juvenile Offender

PSYCHIATRIC
60 = Character or Behavior Disorder
62 = Enuresis

ERRONEOUS ENLISTMENT
91 = Erroneous Enlistment or Induction

ENTRY LEVEL SEPARATION
87 = Trainee Discharge/Entry Level Performance and Conduct

OTHER
2 = Early Release - Insufficient Retainability
3 = Early Release - To Attend School
4 = Early Release - Police Duty
5 = Early Release - In the National Interest
6 = Early Release - Seasonal Employment
7 = early Release - To Teach
8 = Early Release - Other
22 = Dependency or Hardship
90, 92 - 99 = Other Separations or Discharges
101 = Desertion
102 = Imprisonment

Source: Derived from data obtained from Defense Manpower Data Center.

The second source of data came from the Final AFMET Navy File dating from October 1991 through September 1992 (fiscal 1992), previously maintained by the Air Force Human Resources Directorate, Armstrong Laboratory, at Lackland Air Force Base, Texas. This file and subsequent N-AFMET data (May 1993 through September 1994) are now maintained at DMDC. For purposes of this thesis, only the fiscal 1992 cohort is analyzed. Data in this file consist of training information from the Navy Personnel Research and Development Center's Traintrack System File as well as all information processed from the N-AFMET three-phased screening programs conducted at the three

Regional Training Commands in Orlando, San Diego and Great Lakes. The Navy Traintrack system is a longitudinal training episode file for all Navy enlisted personnel. Table III outlines the categories and SACs defined from the N-AFMET data set for the 1992 cohort.

Table III. Separation Action Codes (SACs)

SAC CATEGORY AND CODE

ADMINISTRATION/MOTIVATION
GAB = Negative Navy/Military Attitude
GAL = Demonstrated Lack of Performance Due to School Not What Expected
GBB = Alcohol Rehabilitation
GBE = Unsuitability
GBH = Hardship
GBL = Non-Adaptability to Military Life

MEDICAL
GCB = Pregnancy
GCE = Orthopedic (Service Connected)
GCH = Orthopedic (Pre-Service)
GCP = Podiatry (Pre-Service)
GCV = General Surgery (Pre-Service)
GDE = Urology (Pre-Service)
GDL = Ophthalmology/Optometry (Pre-Service)
GDS = Neurology (Pre-Service)
GDY = Dermatology (Pre-Service)
GEE = Internal Medicine (Pre-Service)
GEH = Ear, Nose, Throat (Service Connected)
GEL = Ear, Nose, Throat (Pre-Service)
GES = Gynecology (Pre-Service)

PSYCHIATRIC
GEV = Psychiatric (Service Connected)
GEY = Psychiatric (Pre-Service)
GFB = Psychiatric - Suicidal Attempts/Ideations (Service Connected)
GFE = Psychiatric - Suicidal Attempts/Ideations (Pre-Service)
GFH = Psychological - Personality Disorders
GFL = Psychological - Enuresis
GFP = Psychological - Sleepwalking
GFS = Psychological - Situation Reaction Not Aeronautically Adaptable
GGE = Other Medical (Service Connected)
GGH = Other Medical (Personality Disorder)
GGL = Other Medical (Adjustment Disorder)

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LEGAL
GHP = Misconduct
GHS = Substance Abuse/Incident
GHV = Homosexuality

DEATH
GJH = Suicide

PHYSICAL
GKH = PRT Failure
GKL = Obesity

FRAUDULENT ENLISTMENT
GLB = Initial Drug Screen (Drugs other than Cannabis)
GLE = Initial Drug Screen (Cannabis)
GLL = Drug Disclosure
GLP = Homosexual (Pre-Service)
GLS = Arrest Record (Pre-Service)
GLV = Undisclosed Pre-Service

CONVENIENCE OF THE GOVERNMENT
GMB = Erroneous Enlistment
GME = Erroneous Enlistment - Moment of Truth
GMF = Erroneous Enlistment - Navy/AFMET
GNB = Contract or Obligation

GRADUATES FROM SCHOOL
P* = Successful Graduation from School (Course)

Source: Derived from data obtained from Defense Manpower Data Center.

The rest of the N-AFMET file contains information recorded on the Phase 1 - HOI (History and Opinion Inventory) data scoring sheet, the Phase 2 - "NEO" and SRI (Structured Response Interview) scoring sheets and the Phase 3 - Clinical Disposition sheet. Variables chosen from this data set are found in Table IV.

Table IV. Variables and Corresponding Definitions from N-AFMET File, 1992 Cohort

VARIABLE	DEFINITION

TEST   HOI: Emotional instability scale
                            Antisocial behavior scale

                NEO: 1 (Neuroticism)
                            2 (Extroversion)
                            3 (Openness)
                            4 (Agreeableness)
                            5 (Conscientiousness)

RTC   Regional Training Center (RTC):
                        Orlando
                        Great Lakes
                        San Diego

BIDISP   Interviewer Disposition (following Phase 2)

BCDISP   Clinician Disposition (following Phase 3)

Source: Derived from data obtained from Defense Manpower Data Center

The two 1992 cohort files (DSCAC & N-AFMET) were merged to present an accurate picture of recruits processed through N-AFMET in 1992. Once all missing data were deleted, the initial merged data set contained 46,635 observations. Enlistment contracts in these files ranged from two to eight years of obligation. This thesis only reviewed the four-year "obligors" (personnel who have a specified enlistment obligation), because they comprise the largest group of enlistees. In addition, the following were deleted from the data file: persons who had prior enlisted service before entering the Navy in 1992 and those who were discharged from the Navy for "Expired Term of Service" (meaning that they had successfully completed their term of enlistment. The final number of non-prior service, four-year obligors who were processed through N-AFMET in 1992 numbered 36,343.

B. METHODOLOGY

1. The N-AFMET Process

All recruits reporting to the RTC follow a sequential process designed to immediately separate out those who do not meet specified criteria. Figure 1 lays out the three phases of the N-AFMET process.

INPROCESSING DAY

Returned to Duty

PHASE 1

PHASE 2

PHASE 3

TRAINING
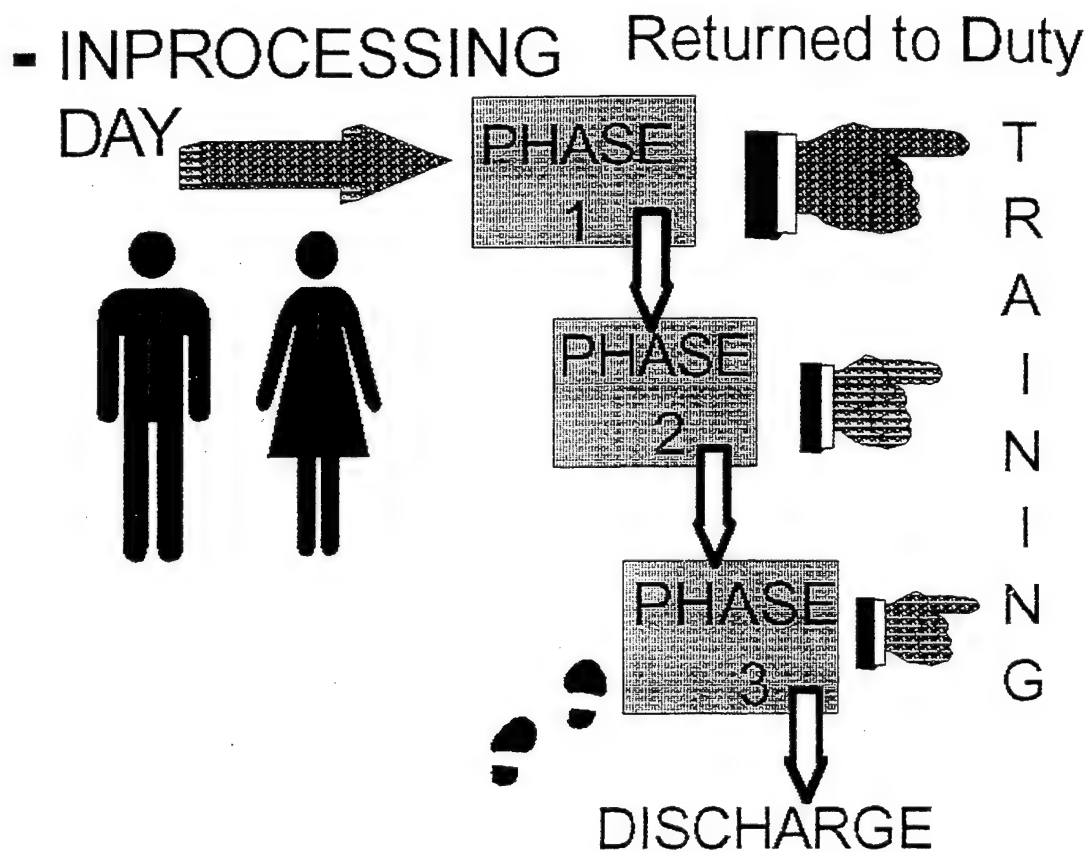
DISCHARGE

Figure 1. N-AFMET Screening Outcome Process, Fiscal 1992

All recruits assigned to the three "Returned to Duty" groups continue on to BMT. If they graduate from BMT, they proceed to an "A" school or apprenticeship training. If they are discharged during BMT, "A" school, or apprenticeship training, their record will indicate a SAC of attrition (see Table III) and a corresponding ISC (see Table II). If attrition occurs in the Fleet, records only indicate an ISC.

2. Definitions

The following definitions are used in describing the personnel who belong in each group of the N-AFMET Phase outcomes:

ATTRITE 1   Personnel who attrite during training or in the fleet following Phase 1 "Return to Duty."

SUCCESS 1   Personnel who remain on active duty, as of OCT 1994, following Phase 1 "Return to Duty."

ATTRITE 2   Personnel who attrite during training or in the fleet following Phase 2 "Return to Duty" (Interviewer Disposition = 1).

SUCCESS 2   Personnel who remain on active duty, as of OCT 1994, following Phase 2 "Return to Duty" (Clinician Disposition = 1).

ATTRITE 3   Personnel who attrite during training or in the fleet following Phase 3 "Return to Duty" (Interviewer Disposition = 1).

SUCCESS 3   Personnel who remain on active duty, as of OCT 1994, following Phase 3 "Return to Duty" (Clinician Disposition = 1).

ATTRITE 1, 2 and 3 in the fiscal 1992 cohort have also been broken down into completed months of active duty service. These are as follows:

- 0 to 3 months (Basic Military Training or BMT)

- 4 to 12 months ("A" school/first duty station)

- 13 to 24 months (2nd year in Navy)

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- 25 to 35 months (3rd year in Navy)

- 36 to 48 months (4th year in Navy - fiscal 1990 and 1991 cohorts)

Dividing up the cohorts into these monthly groupings allows personnel to be compared for differences in demographics and reasons for leaving in each time period. Previous studies of attrition have demonstrated that entering cohorts have the largest loss rate during the first twenty months of military service. Buddin (1984) found that the first six months contributed a loss rate of over 10 percent. Klein (1991) found that attrition for a Navy cohort (fiscal 1985) differed according to gender: men attrited more between months 7 and 20; women attrited more in months 1 and 2. Since N-AFMET began in 1992 and updates are only available for this study through September 1994, a maximum total time-of-service of thirty-six months is available for the 1992 cohort. Although 1990 and 1991 cohorts can be tracked through forty-eight months, attrition in all three cohorts is compared for 0 - 36 months.

3. Multiple Regression Analysis

Multiple regression analysis is a valuable statistical technique. It shows the impact of incremental changes in a defined explanatory (independent) variable on a dependent variable, holding all else constant (*ceterus paribus*). The explanatory variables chosen for the regression help to "explain" the reasons for the value placed on the dependent variable. For example, the months of active duty an enlisted member chooses to serve in the Navy may be explained as a "function" of variables (i.e., age, race, or education) that affect the decision to stay or leave early, *ceterus paribus.*

This thesis uses logit multivariate regressions (probability models) to analyze the attrition decisions made within the merged 1992 cohort. The logit models are designed to gauge probabilities for attrition $(L = 0)$ and non-attrition $(L = 1)$ using a variety of explanatory variables, including the N-AFMET instruments (HOI, NEO). For estimation purposes the algorithm is written as:

$$L_i = \ln \left(\frac{p_i}{1-P_i} \right) = B_1 + B_2 X_i + u_i$$

This regression shows that the estimated slope coefficient (B) measures the change in L for a unit change in X: that is, it tells how the log-odds in favor of attriting change as X (e.g., age) changes by a unit, say, 1 year.

Given specific Xs (e.g., ages), we want to estimate not the odds in favor of attriting but the probability of attriting itself. Once we obtain the estimates of B_i, we can find the probability by using the algorithm:

B_i (P/(1-P)) where P = # of attrites (L=0) / total # in sample (L=0 + L=1)

Specifically, each Phase Attrite group (Attrite 1, Attrite 2, and Attrite 3) can be analyzed for significant explanatory variables (X_i). Attrite 1 personnel are analyzed for differences within the four time periods (0-3 months, 4-12 months, 13-24 months, and 25-36 months).

N-AFMET's Phase 1 tool, the HOI, can also be analyzed in a logit multivariate analysis. Individual questions from the two scales can be modeled to gauge the probabilities for attrition and non-attrition. Table V presents the regression models used in the logit multivariate regression analyses.

Table V. Description of Logistic Multivariate Models by Phase

Phase 1 "Return to Duty":

    ATTRITION = f
        (YOUTH, MATURE, SENIOR, BLACK, HISP., ASIAN,
        HOI: E.I., HOI: ANTISOC., AFQT CAT.I,
        AFQT CAT. IIIA, AFQT CAT. IIIB, HS DIP,
        HS DIP., SINGLE 1 DEP., SIN.2 DEP.,
        MARRIED 1 DEP., MAR 2 DEP.)

Phase 1 "Return to Duty" (0-3 MO/4-12 MO/13-24 MO/25-36 MO): ·

    ATTRITION = f
        (YOUTH, MATURE, SENIOR, BLACK, HISP., ASIAN,
        HOI: E.I., HOI: ANTISOC., AFQT CAT.1,
        AFQT CAT. IIIA, AFQT CAT. IIIB, HS DIP,
        ALT. HS DIP., SINGLE 1 DEP., SIN.2 DEP.,
        MARRIED 1 DEP., MAR 2 DEP.)

Phase 1 "Return to Duty" HOI/Emotional Instability:

    ATTRITION = f
        (Questions 6, 7, 8, 12, 13, 17, 19, 20, 24, 28, 32, 33, 35, 38, 40, 43, 44, 48)

Phase 1 "Return to Duty" HOI/Antisocial Behavior:

    ATTRITION = f
        (Questions 3, 4, 10, 11, 12, 13, 15, 16, 20, 22, 23, 26, 27, 30, 31, 32, 33, 35, 36,
        38, 39, 41, 43, 44, 45, 47)

Phase 2 "Return to Duty":

    ATTRITION = f
        (YOUTH, MATURE, SENIOR, BLACK, HISP., ASIAN,
        HOI: E.I., HOI: ANTISOC., NEO1-M/F,
        NEO4-M/F, NEO5-M/F, AFQT CAT.I, AFQT CAT. IIIA,
        AFQT CAT. IIIB, HS DIP, ALT. HS DIP.,
        SIN. 1 DEP., SIN.2 DEP., MARRIED 1 DEP., MAR 2 DEP.)

Phase 3 "Return to Duty":

    ATTRITION = f
        (YOUTH, MATURE, SENIOR, BLACK, HISP., ASIAN,
        HOI: E.I., HOI: ANTISOC., NEO1-M/F,
        NEO4-M/F, NEO5-M/F, AFQT CAT.I, AFQT CAT. IIIA,
        AFQT CAT. IIIB, HS DIP, ALT. HS DIP.,
        SIN. 1 DEP., SIN. 2 DEP., MARRIED 1 DEP., MAR 2 DEP.)

IV. RESULTS

This chapter summarizes analyses using specially developed data files on enlisted recruits who entered the Navy in fiscal 1992. Attrition information is also compared for three fiscal cohorts of recruits. First, an analysis of the fiscal 1992 N-AFMET screening outcomes and demographics is presented. Figure 2 shows the screening outcomes for Phase 1, 2, and 3 of the N-AFMET process. Tables VI and VII detail Phase 2 and Phase 3 screening outcomes by technician and clinician dispositions, respectively. Table VIII presents the demographics for the three phases, including the Interservice Separation Code categories and the HOI scales. Figure 3 presents the percentages of attrition for the three phases. Tables IX, X, and XI show the reasons why recruits separated, by months of service, according to each N-AFMET Phase.

The second part of this chapter presents the results from the logit multivariate regressions for Phase 1 (Tables XII and XIII), Phase 2 (Table XIV) and Phase 3 (Table XV). In addition, logit multivariate regression results are presented for the Phase I-HOI-Emotional Instability scale (Tables XVII and XVIII) and the Antisocial Behavior scale (Tables XIX and XX).

Finally, the three cohorts are compared on the basis of their attrition behavior. Figure 4 displays 36-month attrition, by months of service, for recruits entering the Navy in 1990, 1991, and 1992. Table XXI and Figure 5 present the reasons for the 36-month attrition by each of the three cohorts.

A. N-AFMET SCREENING OUTCOMES

Figure 2 shows the N-AFMET screening outcomes for the 1992 cohort. The largest group to note is Phase 1 "Return to Duty," with 34,393 individuals. Everyone in this group took the HOI and was not identified as needing further evaluation for psychological problems. Out of this group, 25,123 people (69.1 percent of the total entering cohort of 36,340) remained on active duty. At the same time, 9,270 people (25.5

1992 N-AFMET
SCREENING OUTCOMES

ALL RECRUITS (36,340)

PHASE I: HOI (36,340)

Return to Duty (34,393) (94.6%)*

PHASE 2: SRI,NEO (1,947) (5.4%)*

Success 1   Attrite 1   Return To Duty   PHASE 3:CLINICIAN INTERVIEW

(25,123)   (9,270)   (581) (1.6%)*   (1,371) (3.8%)*
(69.1%)*   (25.5%)*

Success 2   Attrite 2   Identified
                          Out
(355)   (226)   (663)   Return to Duty
(.9%)*   (.6%)*   (1.8%)*   (703)   (1.9%)*

Success 3   Attrite 3

(333)   (224)
(.9%)*   (.6%)*
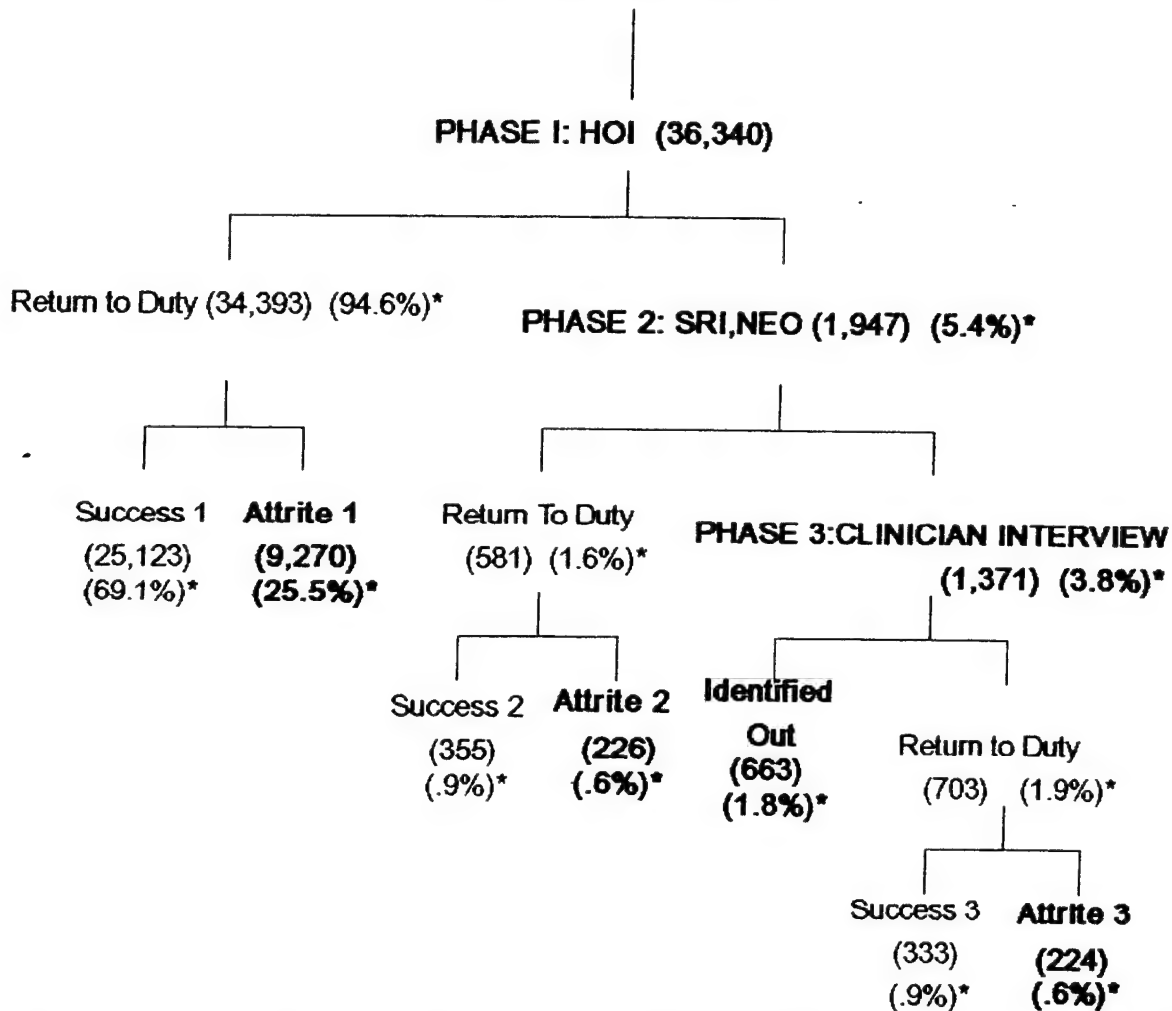
Source: Derived from data obtained from Defense Manpower Data Center.
*All percentages are based on the total population of entering recruits.

Figure 2. N-AFMET Screening Outcomes, Fiscal 1992 Cohort

percent of the total entering cohort) have left the Navy prior to completing their four-year term of enlistment.

The Phase 1 HOI instrument identified 1,947 people (5.4 percent of the total entering cohort) as needing further evaluation. These recruits proceeded to Phase 2, where they were administered the NEO and the SRI. Table VI presents the technician dispositions for this group.

Table VI. Phase 2: Technician Dispositions Personnel Administered the NEO and SRI, Fiscal 1992 Cohort

DISPOSITION	PERSONNEL (N = 1,947)	
	NUMBER	PERCENT OF TOTAL
Return to Duty	581	29.8
Referral to Phase 3	1,354	69.6
N/A (Never interviewed or shipped out before completing N-AFMET action)	6	.3
Prior N-AFMET release	1	.1
Hospitalized (Psychiatric Reasons)	5	.2

Source: Derived from data obtained from Defense Manpower Data Center.

Table VII presents the Clinician dispositions for the 1,371 recruits referred to Phase 3. All of these recruits completed the HOI, NEO, SRI and an interview with a clinician.

Phase 3 identified 663 individuals (1.8 percent of the total entering cohort of 36,340, or 48 percent of the 1,371 referred to Phase 3) as having a psychological problem warranting a recommendation for immediate discharge from the Navy. Recruits with personality disorders accounted for 31 percent of the clinical diagnoses. A disposition of

Axis 1 (Situational Distress -- motivated to resolve indicated crisis) and severe adjustment disorders accounted for approximately 20 percent of the cases.

Of the 557 recruits who were "Returned to Duty" following Phase 3, a total of 333 (.9 percent of the cohort) continued on active duty (as of September 1992), while 224 (.6 percent of the cohort) separated from the Navy before completing their first term of enlistment.

Table VII. Phase 3: Clinician Dispositions, Fiscal 1992 Cohort

DISPOSITION	PERSONNEL (N = 1,371)	
	NUMBER	PERCENT OF TOTAL
Return to Duty	557	40.6
Alcohol/Drug Dependent	80	5.8
Post Traumatic Stress Disorder (PTSD)	8	.6
Hospitalize Immediately (Psychiatric Reasons)	12	.9
Personality Disorder	426	31.4
Severe Adjustment Disorder	119	8.7
Any AXIS 1: Referred to Group (Situational Distress - motivated to resolve the indicated crisis) and returned to duty	146	10.6
Other Non-AFMET related Attrition	18	1.4

Source: Derived from data obtained from Defense Manpower Data Center.

B. DEMOGRAPHICS

Table VIII shows the demographic composition of the three attrition groups (Phase 1, Phase 2, and Phase 3). From this table, the following results are noted:

Months of Service:

Approximately 33 percent of the attrition in all three N-AFMET phases occurred either in months 0-3 or months 13-24. Months 4-12 accounted for approximately 25 percent of the attrition, with approximately 10 percent occurring in the last 25-36 months.

Age:

Greater than 50 percent of all the recruits who attrited in all three phases were eighteen to nineteen years old. The next largest age group who attrited in the three phases was twenty-one to thirty-five years old, representing approximately 22 percent of attrition.

Gender:

In all three phases, men accounted for greater than 80 percent of the attrition population. Attrite 2 was almost entirely composed of men, representing 98.7 percent of attrition during the time frame.

Interservice Separation Codes:

Medical (physical) reasons accounted for 10 percent of Attrite 1, and approximately 7 percent Attrite 2 and Attrite 3. Averaging across the three phases, fraud and psychiatric reasons accounted for approximately 16 percent of attrition, with Attrite 1 percentages the lowest. Legal reasons accounted for about 16 percent of attrition in Attrite 1, rising to 23-24 percent in Attrite 2 and Attrite 3. Although the "All Others" category accounts for at least 18 percent of attrition (33 percent for Attrite 1), this category, is a "catch-all" for ISCs not listed here.

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<u>HOI</u>:

The mean scores for the Emotional Instability and Antisocial Behavior scales are the lowest in Attrite 1 (.244 and .499, respectively), and increase in Attrite 2 (.399 and .945, respectively) and Attrite 3 (.508 and 1.007, respectively). As indicated in Chapter I, the higher the score on these scales, the greater the possibility of a psychiatric problem.

Table VIII. Percentage Distribution of Selected Explanatory (Independent) Variables for Attrite 1, Attrite 2, and Attrite 3, Fiscal 1992 Cohort

SELECTED VARIABLES	ATTRITE 1 Percent	Number	ATTRITE 2 Percent	Number	ATTRITE 3 Percent	Number
MONTHS OF SERVICE						
0 - 3	32.4	3008	33.2	75	31.3	70
4 - 12	22.8	2112	25.2	57	22.8	51
13 - 24	37.0	3426	28.3	64	36.2	81
25 - 35	7.8	724	13.3	30	9.8	22
AGE (YEARS)						
17	3.8	352	3.1	7	4.5	10
18-19	56.7	5260	56.6	128	57.1	128
20	14.7	1363	16.8	38	17.0	38
21-35	24.8	2296	23.5	53	21.4	48
RACE/ETHNICITY						
WHITE	70.7	6556	69.0	156	76.3	171
BLACK	16.5	1529	22.1	50	14.3	32
ASIAN	1.6	145	1.8	4	1.8	4
HISPANIC	10.1	934	6.2	14	5.8	13
OTHER	1.1	106	.9	2	1.8	4
AFQT CATEGORY						
I	4.4	406	2.2	5	7.1	16
II	34.7	3220	29.2	66	34.8	78
IIIA	26.4	2450	23.4	53	29.5	66
IIIB	34.5	3190	45.2	108	28.6	64
GENDER						
MALE	82.6	7659	98.7	223	87.9	197
FEMALE	17.4	1611	1.3	3	12.1	27
RECRUIT TRAINING CENTER (BASE)						
ORLANDO	37.9	3515	3.5	8	70.5	158
GREAT LAKES	43.6	4044	51.3	116	21.9	49
SAN DIEGO	18.5	1711	45.2	102	7.6	17

HIGHEST YEARS OF EDUCATION

NO HIGH SCHOOL DIPLOMA	.6	59	1.8	4	0	
HIGH SCHOOL DIPLOMA	93.4	8653	92.0	208	93.8	210
ALTERNATIVE HS CREDENTIAL	4.4	402	6.2	14	5.8	13
SOME COLLEGE	.6	58	.0		.4	1
COLLEGE DEGREE	0	2	0		0	

MARITAL STATUS/NUMBER OF DEPENDENTS

SINGLE/0 DEP	89.9	8332	91.2	206	95.1	213
SINGLE/1 DEP	3.5	322	4.9	11	2.8	6
SINGLE/2 DEP	.6	57	.9	2	.9	2
MARRIED/0 DEP	0		0		0	
MARRIED/1 DEP	3.0	277	1.7	4	.4	1
MARRIED/2 DEP	2.7	251	1.3	3	.4	1
MARRIED/3 DEP	.3	31	0		.4	1

INTERSERVICE SEPARATION CODES

MEDICAL (Physical)	10.2	943	7.1	16	6.7	15
ADMINISTRATION /MOTIVATION	.4	38	.1	2	0	
ENTRY LEVEL SEPARATION	6.5	601	5.9	13	10.3	23
DEATH	0	1	0		0	1
OTHERS OF INTEREST	2.9	269	3.1	7	3.6	8
FRAUD	12.4	1150	21.6	48	16.1	36
CONVENIENCE OF GOV	1.7	156	1.8	4	3.1	7
LEGAL	16.1	1490	24.4	55	23.6	53
PSYCHIATRIC	16.6	1539	16.9	38	18.3	41
ALL OTHERS	33.2	3082	19.1	43	18.3	41

HOI

	MEAN	(RANGE)	MEAN	(RANGE)	MEAN	(RANGE)
Emotional Instability	.244	(0-14)	.399	(0-12)	.508	(0-13)
Antisocial Behavior	.494	(0-21)	.945	(3-18)	.1007	(2-20)

NEO

NEO (N) m/f	(N)	M=23.7/f=25.2
NEO (A) m/f	(A)	M=27.5/f=29.9
NEO (C) m/f	(C)	M=30.9/f=31.6

Source: Derived from data obtained from Defense Manpower Data Center.

Figure 3 presents a graph showing the attrition rates for all three phases of the N-AFMET process, by months of service. It is clear from this graph that Attrite 1 attrition drives the total attrition rate for the 1992 cohort. In fact, Attrite 1 attrition over the total 36-month period was 25.5 percent, compared with just 0.6 percent for each of the subsequent phases of the N-AFMET. It should be noted, however, that these data present an incomplete picture of attrition for the 1992 cohort. Since the fiscal 1992 cohort was tracked only through the end of September 1994, no one in the cohort could have had the opportunity of serving for a complete thirty-six months; and full "maturation" of the

cohort (when everyone has had the opportunity of serving for four years) will not occur until the end of September in 1996.

PERCENTAGE OF TOTAL COHORT
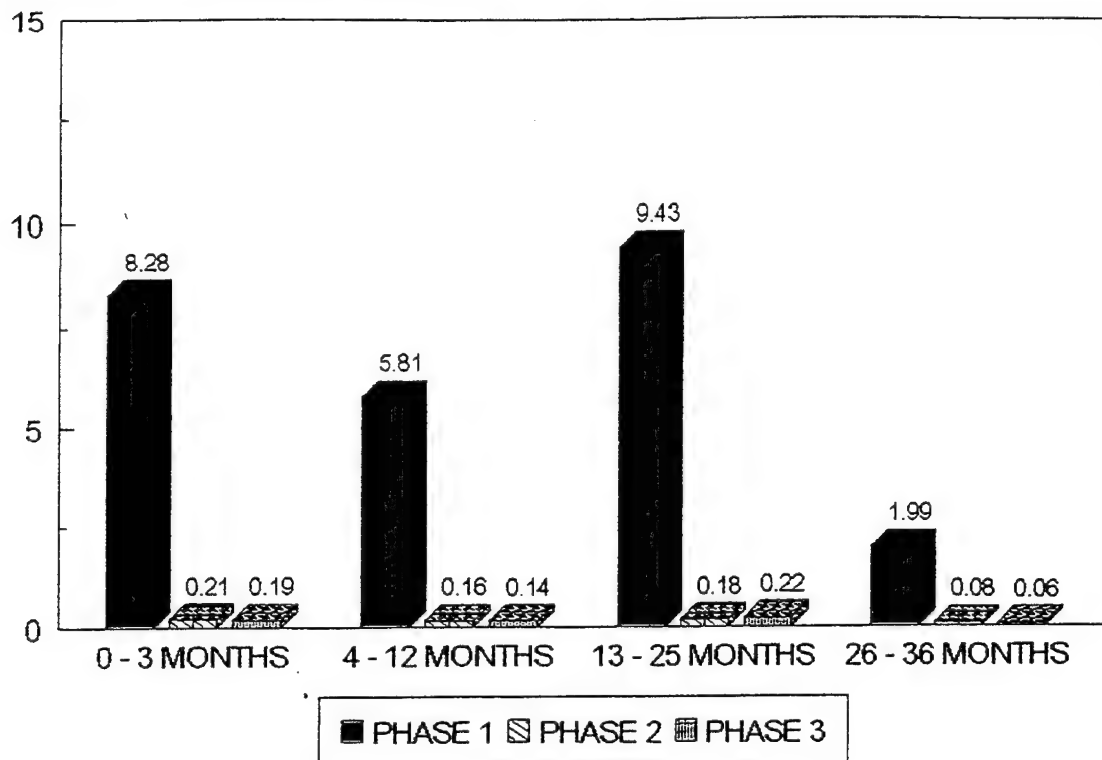
Figure 3. Attrition Rates (Percent) for N-AFMET Phases 1, 2 and 3, Fiscal 1992 Cohort.

Table IX presents ISC categories (as previously described in Table II) for Attrite I, by months of service. As seen here, months 13-24 accounted for 3.4 percent of the medical attrition for physical reasons. This same time period (months 13 through 24) also accounted for the greatest amount of the legal (9.6 percent) and fraud (5.3 percent) attrition. However, the greatest amount of psychiatric attrition occurred in months 0-3 (5.6 percent) and months 4-12 (6.2 percent).

The assignment of one primary ISC as the reason for separation may be somewhat misleading. The data in this file support the findings of Idar and Scaramozzino (1992), who found that the 1992 N-AFMET recruits were often diagnosed with concurrent psychological disorders. Similarly, when Klein, et al., (1991) opened individual service records, they found different reasons for discharge noted other than the ISCs reported in the personnel loss files.

Table IX. Number and Percentage of Distribution of Attrite 1 by Interservice Separation Codes (ISCs) and Months of Service, Fiscal 1992 Cohort

ISC	MONTHS OF SERVICE				
	TIME 1 0 - 3	TIME 2 4 - 12	TIME 3 13 - 24	TIME 4 25 - 36	TOTAL
MEDICAL (PHYSICAL)	215 (1.9%)	216 (1.9%)	384 (3.4%)	128 (1.1%)	943 (10.2%)
ADMINISTRATION MOTIVATION	1 (.01%)	12 (.1%)	21 (.2%)	4 (.04%)	38 (.4%)
ENTRY LEVEL SEPARATION	529 (5.7%)	72 (.8%)	0	0	601 (6.5%)
CONVENIENCE OF GOVERNMENT	5 (.1%)	82 (.9%)	58 (.6%)	11 (.1%)	156 (1.7%)
LEGAL	19 (.2%)	412 (4.4%)	890 (9.6%)	169 (1.8%)	1,490 (16.1%)
OTHER OF INTEREST	257 (2.8%)	9 (.1%)	3 (.03%)	0	269 (2.9%)
DEATH	0	1 (.01%)	1 (.01%)	0	2 (.01%)
FRAUD	201 (2.2%)	353 (3.8%)	495 (5.3%)	101 (1.1%)	1,150 (12.4%)
PSYCHIATRIC	523 (5.6%)	571 (6.2%)	372 (4.0%)	73 (.8%)	1,539 (16.6%)
ALL OTHERS	1,258 (13.6%)	385 (4.2%)	1,20 (13.0%)	238 (2.6%)	3,082 (33.2%)
TOTAL	3,008 (32.4%)	2,113 (22.8%)	3,425 (37.0%)	724 (7.8%)	9,270 (100.0%)

Source: Derived from data obtained from Defense Manpower Data Center.

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Tables X and XI present the ISCs for Attrite 2 and Attrite 3, respectively, by months of service. Table X (Attrite 2) shows that months 0-3 account for 3.1 percent of the medical attrition for physical reasons. Months 13-24 account for 12.8 percent of the legal attrition. Fraud has the largest percentage of attrition occurring in months 0-3 (7.1 percent) and months 13-24 (6.2 percent). Psychiatric reasons occur greatest in months 0-3 (7.5 percent) and months 4-12 (5.3 percent).

Table X. Number and Percentage Distribution of Attrite 2 by Interservice Separation Codes (ISCs) and Months of Service, Fiscal 1992 Cohort

ISC	MONTHS OF SERVICE				
	TIME 1 0 - 3	TIME 2 4 - 12	TIME 3 13 - 24	TIME 4 25 - 36	TOTAL
MEDICAL (PHYSICAL)	7 (3.1%)	2 (.9%)	5 (2.2%)	2 (.9%)	16 (7.1%)
ADMINISTRATION MOTIVATION	0 (.9%)	2	0	0 (.9%)	2
ENTRY LEVEL SEPARATION	8 (3.4%)	5 (2.1%)	0	0	13 (5.8%)
CONVENIENCE OF GOVERNMENT	0 (1.3%)	3 (.4%)	1	0 (1.8%)	4
LEGAL	0 (6.6%)	15 (12.8%)	29 (4.9%)	11 (24.3%)	55
OTHERS OF INTEREST	7 (3.1%)	0	0	0	7 (3.1%)
FRAUD	16 (7.1%)	12 (5.3%)	14 (6.2%)	6 (2.7%)	48 (21.6%)
PSYCHIATRIC	17 (7.5%)	12 (5.3%)	5 (2.2%)	4 (1.8%)	38 (16.8%)
ALL OTHERS	20 (8.9%)	6 (2.7%)	10 (4.4%)	7 (3.1%)	43 (19.0%)
TOTAL	75 (33.2%)	57 (25.2%)	64 (28.3%)	30 (13.3%)	226 (100.0%)

Source: Derived from data obtained from Defense Manpower Data Center.

Table XI (Attrite 3) shows that the highest frequencies of attrition for reasons related to medical/physical (3.5 percent), legal (11.2 percent) and fraud (7.6 percent) occurt in months 13-24. Psychiatric reasons continue to occur at the highest rate (8.9 percent) in months 0-3. It should be noted that the percentages in both 2 and 3 typically correspond to very small numbers.

Table XI. Number and Percentage Distribution of Attrite 3 by Interservice Separation Codes (ISCs) and Months of Service, Fiscal 1992 Cohort

| | MONTHS OF SERVICE | | | | |
ISC	TIME 1 0 - 3	TIME 2 4 - 12	TIME 3 13 - 24	TIME 4 25 - 36	TOTAL
MEDICAL (PHYSICAL) ADMINISTRATION	1 (.5%)	3 (1.3%)	8 (3.5%)	3 (1.3%)	15 (6.7%)
MOTIVATION	0	0	0	0	0
ENTRY LEVEL SEPARATION	18 (8.0%)	5 (2.2%)	0	0	23 (10.3%)
CONVENIENCE OF GOVERNMENT	0 (.9%)	2 (2.2%)	5	0 (3.1%)	7
LEGAL	1 (.5%)	15 (6.7%)	26 (11.2%)	11 (4.7%)	53 (23.7%)
OTHERS OF INTEREST	7 (3.1%)	0	1 (.5%)	0	8 (3.57)
FRAUD	4 (1.7%)	12 (5.4%)	17 (7.6%)	3 (1.3%)	36 (16.1%)
PSYCHIATRIC	20 (8.9%)	10 (4.5%)	9 (4.0%)	2 (1.9%)	41 (18.3%)
ALL OTHERS	19 (8.5%)	4 (1.3%)	15 (6.7%)	3 (1.3%)	41 (18.3)
TOTAL	70 (31.2%)	51 (22.8%)	81 (36.2%)	22 (9.8%)	224 (100.0%)

Source: Derived from data obtained from Defense Manpower Data Center.

C. MULTIVARIATE ANALYSIS

The attrition phases can be analyzed for variables that are statistically significant using the models presented in the "Multivariate Analysis" section of Chapter III. Table XII presents a logit multivariate regression analysis of all recruits who were returned to duty after completing the HOI in Phase 1.

From this analysis, it can be seen that there are many variables significant at the .01 level. As this is a logit multivariate model, the regression has been coded to look at the probability of attrition. The two HOI scales have been entered into the equation as continuous variables: the Antisocial Behavior scale ranges from 0-21; and the Emotional Instability scale ranges from 0-14. Of all the explanatory variables, the Antisocial Behavior scale shows the largest Wald Chi Square value at 317.52. This indicates that the statistical significance of this scale at the P=.0001 is **not** due to random chance. The .02 percent change in probability means that, if a score on the Antisocial Behavior scale increases by 1, the probability of attrition increases by .02 percent. Although this percentage does not appear to be large for an increase in score of one point, it will increase as the score is increased (e.g., an Antisocial Behavior scale score of 5 increases the probability of attrition at .1 percent).

Other statistically significant variables at the .01 level that increase an individual's potential to attrite include: AFQT Category I, IIIA, and IIIB; female gender; possessing an alternative high school diploma; having dependents; and being older (21-35 years). Variables significant at the .01 level that decrease the probability to attrite include: being of a minority race (Asian or black); and receiving recruit training in either Orlando or Great Lakes. Logit multivariate analyses of the Phase 1 "Return to Duty" group by months of service can be found in the Appendix (Tables A-2, A-3 and A-4).

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Table XII. Logit Model Estimating the Probability of Attrition for Phase 1 "Return to Duty," Fiscal 1992 Cohort

INDEPENDENT VARIABLES	COEFFICIENT ESTIMATE		CHANGE IN PROBABILITY
AGE (YEARS)			
17	.039	(.36)	.01
20	.035	(.90)	.01
21 - 35	.123	(14.86)*	.02
RACE/ETHNICITY			
BLACK	-.145	(16.37)*	-.03
ASIAN	-.742	(63.62)*	-.15
HISPANIC	-.070	(2.79)	-.01
TEST			
HOI: EMOTIONAL INSTABILITY	.016	(3.78)**	.0
ANTISOCIAL BEHAVIOR	.114	(317.52)*	.02
AFQT CATEGORY			
IIIA	.222	(47.40)*	.04
IIIB	.449	(194.17)*	.09
I	.163	(7.16)**	.03
EDUCATION			
HIGH SCHOOL DIPLOMA	.062	(.56)	.01
ALTERNATIVE HS CREDENTIAL	.655	(38.17)*	.13
MARITAL STATUS/NUMBER OF DEPENDENTS			
SINGLE/1 DEPENDENT	.358	(23.36)*	.07
SINGLE/2 DEPENDENTS	.383	(5.06)**	.08
MARRIED/1 DEPENDENT	.193	(6.53)*	.04
MARRIED/2 DEPENDENTS	.202	(6.47)*	.04
RTC			
ORLANDO	-.201	(24.47)*	-.04
GREAT LAKES	-.088	(6.27)*	-.02
GENDER			
FEMALE	.446	(116.05)*	.09
INTERCEPT	-1.762	(375.21)*	-.35
Chi-Square	1409.071		
Concordance Ratio***	62.4%		
Sample Size	34393		

Source: Derived from data obtained from Defense Manpower Data Center.

Statistics in parentheses are Wald Chi-Square values.

*Significant at the .01 level.

**Significant at the .05 level.

***Is a measure of the predictive ability of the model.

Table XIII and Table XIV present the results of the Phase 2 and Phase 3 logit multivariate regressions. The sample size for these regressions (Phase 2 = 576, Phase 3 = 546) is much smaller than that of Table XIII (Phase 1 = 34,393).

In Table XIII, Phase 2 multivariate regression analysis, the only variables to show significance at the .01 level are the HOI scale scores. Interestingly, an increase in score of 1 on the Antisocial Behavior scale increases the probability of attrition by .04 percent, while an increase in score of 1 on the Emotional Instability scale decreases the probability of attrition by .03. Although the Phase 2 Chi Square statistic of 36 is much lower than the Phase 1 Chi Square statistic of 1,409 (Table XIII), the concordance ratio of 62.8 percent shows that the model has a relatively high predictive ability.

Table XIV, Phase 3 multivariate regression analysis, presents different significant variables than those found in Phase 2 (Table XIII). Here, the variable for the older individual (21-35 years) is significant at the .05 level. The variables for the Male NEO 1 (Neuroticism) and Male NEO 4 (Agreeableness) variables are also significant at the .01 and .05 level, respectively. Interpretation of the Male NEO 1 score reveals that a 1 point increase in score increases the probability of attrition by .17 percent.

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Table XIII. Logit Model Estimating the Probability of Attrition for Phase 2 "Return to Duty," Fiscal 1992 Cohort

INDEPENDENT VARIABLES	COEFFICIENT ESTIMATE		CHANGE IN PROBABILITY
AGE (YEARS)			
17	.879	(2.37)	.21
20	-.151	(.40)	-.04
21 - 35	.423	(3.32)	.10
RACE/ETHNICITY			
BLACK	.128	(.29)	.03
ASIAN	.613	(.71)	.15
HISPANIC	-.611	(3.05)	-.15
TEST			
HOI: EMOTIONAL INSTABILITY	-.123	(6.49)*	-.03
ANTISOCIAL BEHAVIOR	.151	(11.57)*	.04
NEO: NEO1 - MALE (NEUROTICISM)	.158	(.22)	.04
NEO4 - MALE (AGREEABLENESS)	.535	(3.47)	.13
NEO5 - MALE (CONSCIENTIOUSNESS)	.634	(2.08)	.15
AFQT CATEGORY			
IIIA	.070	(.08)	.02
IIIB	.334	(2.18)	.08
I	-.428	(.54)	.10
EDUCATION			
HIGH SCHOOL DIPLOMA	-.271	(.13)	-.06
ALTERNATIVE HS CREDENTIAL	.086	(.01)	.02
MARITAL STATUS/NUMBER OF DEPENDENTS			
SINGLE/1 DEPENDENT	-.044	(.01)	-.01
MARRIED/1 DEPENDENT	-.222	(.09)	-.05
INTERCEPT	-1.394	(2.54)	-.33
Chi-Square	36.224		
Concordance Ratio**	62.8%		
Sample Size	576		

Source: Derived from data obtained from Defense Manpower Data Center.

Statistics in parentheses are Wald Chi-Square values.

*Significant at the .01 level.

**Is a measure of the predictive ability of the model.

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Table XIV. Logit Model Estimating the Probability of Attrition for Phase 3 "Return to Duty," Fiscal 1992 Cohort

INDEPENDENT VARIABLES	COEFFICIENT ESTIMATE		CHANGE IN PROBABILITY
AGE (YEARS)			
17	.230	(2.17)	.05
20	.030	(.02)	.01
21 - 35	.569	(5.20)**	.14
RACE & ETHNICITY			
BLACK	-.059	(.04)	.01
ASIAN	.431	(.31)	.10
HISPANIC	-.362	(.95)	-.09
TEST			
HOI: EMOTIONAL INSTABILITY	.008	(.03)	.0
ANTISOCIAL BEHAVIOR	.070	(2.62)	.02
NEO: NEO1 - MALE (NEUROTICISM)	.713	(7.81)*	.17
FEMALE	1.479	(3.14)	.35
NEO4 - MALE (AGREEABLENESS)	.026	(5.59)**	.01
FEMALE	-.355	(.33)	-.09
NEO5 - MALE (CONSCIENTIOUSNESS)	-.172	(.43)	-.04
FEMALE	-.074	(.01)	-.02
AFQT CATEGORY			
IIIA	.294	(1.52)	.07
IIIB	.266	(1.19)	.06
1	.114	(.10)	.03
EDUCATION			
HIGH SCHOOL DIPLOMA	1.717	(2.29)	.41
ALTERNATIVE HS CREDENTIAL	2.258	(3.43)	.52
MARITAL STATUS / NUMBER OF DEPENDENTS			
SINGLE/1 DEPENDENT	-.316	(.34)	-.08
MARRIED/1 DEPENDENT	-.983	(1.29)	-.23
MARRIED/2 DEPENDENTS	-.867	(.49)	-.21
INTERCEPT	-2.857	(5.33)**	-.69
Chi-Square	41.7		
Concordance Ratio**	65.3%		
Sample Size	546		

Source: Derived from data obtained from Defense Manpower Data Center.

Statistics in parentheses are Wald Chi-Square values.

*Significant at the .01 level.

**Significant at the .05 level.

***Is a measure of the predictive ability of the model.

Table XV presents a logit multivariate analysis of the Emotional Instability scale of the HOI for all Phase 1 recruits who were returned to duty. Here, each question is examined for its statistical significance and probability of attrition.

The questions with the largest Wald Chi Square value at the .01 level of significance (#35 and #19) pertain to recognizing and dealing with strong emotions. Other significant questions at the .01 level include: #33 and #20 - preference for school activities; #32, #7, #12, and #13 - medical/physical problems; and #48, #38 and #44 - father's emotional problems, problems with authority, and problems with controlling one's temper.

Table XV. HOI-Emotional Instability Scale, Phase 1 "Return to Duty, " Fiscal 1992 Cohort

ITEM NUMBER AND HOI QUESTION	COEFFICIENT	WALD CHI-SQ	PROBABILITY
#6 I would rather work by myself than with others.	.0873	4.99	.02
#7 I have had more than my share of illness.	.2525	31.40*	.05
#8 I would rather read than be with others.	.0018	.00	.00
#12 I enjoyed physical education.	.1385	12.18*	.03
#13 I often have headaches.	.2539	27.16*	.05
#17 I needed special help with my school studies.	.0781	2.41	.02
#19 I have cried several times this past year.	.1879	36.23*	.04
#20 I never cared much for school.	.1663	26.48*	.03
#24 I was a slow learner at school.	.0577	1.39	.01
#28 I usually take things hard.	.0300	.87	.01
#32 For a long time I have had difficulty sleeping.	.2217	23.15*	.04
#33 I joined the Navy to get a better education.	.2371	31.38*	.05

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#35 I have needed help for emotional problems.	.3760	49.83*	.08
#38 I do not mind orders and being told what to do.	.0942	6.48*	.02
#40 As a child I was a loner.	-.0091	.07	.00
#43 At one time I needed medication to stay calm.	.0977	.51	.02
#44 I often cuss and swear.	.0889	11.31*	.02
#48 My father was a nervous man.	.1577	13.50*	.03
Chi-Square	537.797		
Concordance Ratio**	53.8%	.	.
Sample Size	34,393		

Source: Derived from data obtained from Defense Manpower Data Center.
Statistics in parentheses are Wald Chi-Square values.
*Significant at the .01 level.
**Is a measure of the predictive ability of the model.

Table XVI shows the breakdown of scores on the HOI-Emotional Instability scale for the Phase 1 "Return to Duty" group. The Success 1 group represents those who remained on active duty as of September, 1992; the Attrite 1 group represents those who have attrited. A score at the low end of the 0-14 scale represents a healthier, more emotionally well-balanced person. As the score increases, the potential for emotional problems also increases. This table shows that the Success 1 group has 50 percent of its population with scores of 1 or less, while the Attrite 1 group has 40 percent of its population with a score of 1 or less. Success 1 scores range from 0 - 12, compared with a range of 0 - 14 for the Attrite 1 scores.

Table XVI. HOI-Emotional Instability Scale, Success 1 VS Attrite 1 for Phase 1 "Return to Duty," Fiscal 1992 Cohort

HOI SCORE EMOTIONAL INSTABILITY	SUCCESS 1* NUMBER	(N=25,123) PERCENT	ATTRITE 1** NUMBER	(N=9,270) PERCENT
0	6,332	25.2	1,800	19.4
1	6,305	25.1	2,024	21.8
2	4,867	19.4	1,751	18.9
3	3,213	12.8	1,310	14.1
4	1,949	7.8	888	9.6
5	1,127	4.5	· 575	6.2
6	662	2.6	397	4.3
7	339	1.4	225	2.4
8	193	.8	134	1.5
9	81	.3	80	.9
10	36	.1	37	.4
11	14	.1	19	.2
12	5	.02	18	.2
13	0	0	1	0
14	0	0	2	0

Success 1 Mean score = .192
Attrite 1 Mean score = .244

Source: Derived from data obtained from Defense Manpower Data Center.
*Success 1 = Personnel from Phase 1 "Return to Duty" who remain on active duty as of September 1994.
**Attrite 1 = Personnel from Phase 1 "Return to Duty" who have attrited prior to completing the four-year enlistment obligation.

Table XVII presents a logit multivariate analysis of the HOI-Antisocial Behavior scale for the Phase 1 "Return to Duty" group. Here, each question is examined for its statistical significance and probability of attrition.

The questions at the .01 level of significance with the largest Wald Chi Square value (#11 and #41) both deal with success in school. Other questions significant at the .01 level deal with problems in controlling emotions, physical and medical problems, and authority and legal problems.

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Table XVII. HOI-Antisocial Behavior Scale, Fiscal 1992 Cohort

ITEM NUMBER AND HOI QUESTION	COEFFICIENT	WALD CHI-SQ	PROBABILITY
#3 I quit school because I was failing.	.1029	.81	.02
#4 I plan to attend college.	.1701	23.40*	.03
#10 I often played hooky from school.	.1766	22.53*	.04
#11 I sometimes wanted to run away from school.	.3010	93.61*	.06
#12 I enjoyed physical education.	.1435	12.93*	.03
#13 I often have headaches.	.2673	30.19*	.05
#15 I was expelled or suspended from school.	.1820	28.97*	.04
#16 I quit school because I lost interest.	.2449	10.89*	.05
#20 I never cared much for school.	.0140	.15	.00
#22 I have never done any heavy drinking.	-.0562	1.25	-.01
#23 High school was boring.	.0182	.34	.00
#26 I have been expelled from school more than once.	.2065	5.41**	.04
#27 I think I will make the Navy a career.	.0158	.36	.00
#30 I have been in trouble with the police.	.1165	16.16*	.02
#31 I have been arrested more than twice.	.3470	18.23*	.07
#32 For a long time I have had difficulty sleeping.	.1883	16.59*	.04
#33 I joined the Navy to get a better education.	.1860	18.40*	.04
#35 I have needed help for emotional problems.	.3182	34.98*	.06
#36 I have had my share of trouble with teachers.	.1181	12.42*	.02

#38 I do not mind orders and being told what to do.	.0623	2.77	.01
#39 I feel better when I drink.	-.0795	1.74	-.02
#41 I was suspended from school more than two times.	.2864	38.50*	.06
#43 At one time I needed medication to stay calm.	.0733	.28	.01
#45 I entered the service because because there was nothing else to do.	.1504	16.03*	.03
#47 I have often gone against my parent's wishes.	.1171	15.76*	.02

Chi-Square	1006.631
Concordance Ratio	59.4%
Sample	34393

Source: Derived from data obtained from Defense Manpower Data Center.

Table XVIII shows the breakdown of scores on the HOI-Antisocial Behavior scale for the Phase 1 "Return to Duty" group. As in Table XVI, the Success 1 group represents those who remained on active duty as of September, 1992; the Attrite 1 group represents those who have attrited. A score at the low end of the 0-21 scale represents a healthier, more socially balanced person. As the score increases, the potential for social problems also increases. This table shows that the Success 1 group has 50 percent of its population with scores of three or less, while the Attrite 1 group has 50 percent of its population with a score of four or less. Success 1 scores range from 0 - 18, compared with a range of 0 - 21 for the Attrite 1 scores.

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Table XVIII. HOI-Antisocial Behavior Scale, Success 1 VS Attrite 1 for Phase 1 "Return to Duty," Fiscal 1992 Cohort

HOI SCORE ANTISOCIAL	SUCCESS 1* NUMBER	(N=25,123) PERCENT	ATTRITE 1** NUMBER	(N=9,270) PERCENT
0	16	.06	3	0
1	3,110	12.38	798	8.6
2	4,804	19.1	1,272	13.7
3	4,503	17.9	1,358	14.7
4	3,785	15.1	1,311	14.1
5	2,929	11.7	1,128	12.2
6	2,162	8.6	973	10.5
7	1,447	5.8	732	7.9
8	952	3.8	569	6.1
9	615	2.5	405	4.4
10	355	1.4	260	2.8
11	203	.8	181	2.0
12	118	.5	113	1.2
13	63	.3	67	.7
14	26	.1	47	.5
15	18	.1	21	.2
16	9	.04	17	.2
17	6	.02	11	.1
18	2	.01	1	0
19	0	0	1	0
20	0	0	1	0
21	0	0	1	0

Success 1 mean score = .403
Attrite 1 mean score = .494

Source: Derived from data obtained from Defense Manpower Data Center.
*Success 1 = Personnel from Phase 1 "Return to Duty" who remain on active duty as of September 1994.
**Attrite 1 = Personnel from Phase 1 "Return to Duty" who have attrited prior to completing the four-year enlistment obligation.

The 36-month attrition rates for the 1990, 1991, and 1992 cohorts can also be compared for differences. The time of comparison is limited to thirty-six months, since persons in 1992 cohort were tracked only through September 1994. (Recruits who entered the Navy in fiscal 1992 could thus have served anywhere from twenty-four months [plus one day] to thirty-six months [less one day] by the end of fiscal 1994.)

Figure 4 shows 36-month attrition by months for the 1990, 1991, and 1992 cohorts. The 1992 group has the lowest percentage of attrition in months 0-3 and months 4-12, but falls somewhere between Fiscal 1990 and 1991 in months 13-24. Although months 25-36 show a sharp decline in attrition for the fiscal 1992 cohort, the actual level of attrition is understated, as noted above. Overall, the fiscal 1990 cohort has the greatest amount of attrition at 35.2 percent. The fiscal 1991 cohort is just below this level at 35.2 percent, while the 1992 group (with still incomplete data) has a total rate of 26.7 percent.

% TOTAL COHORT
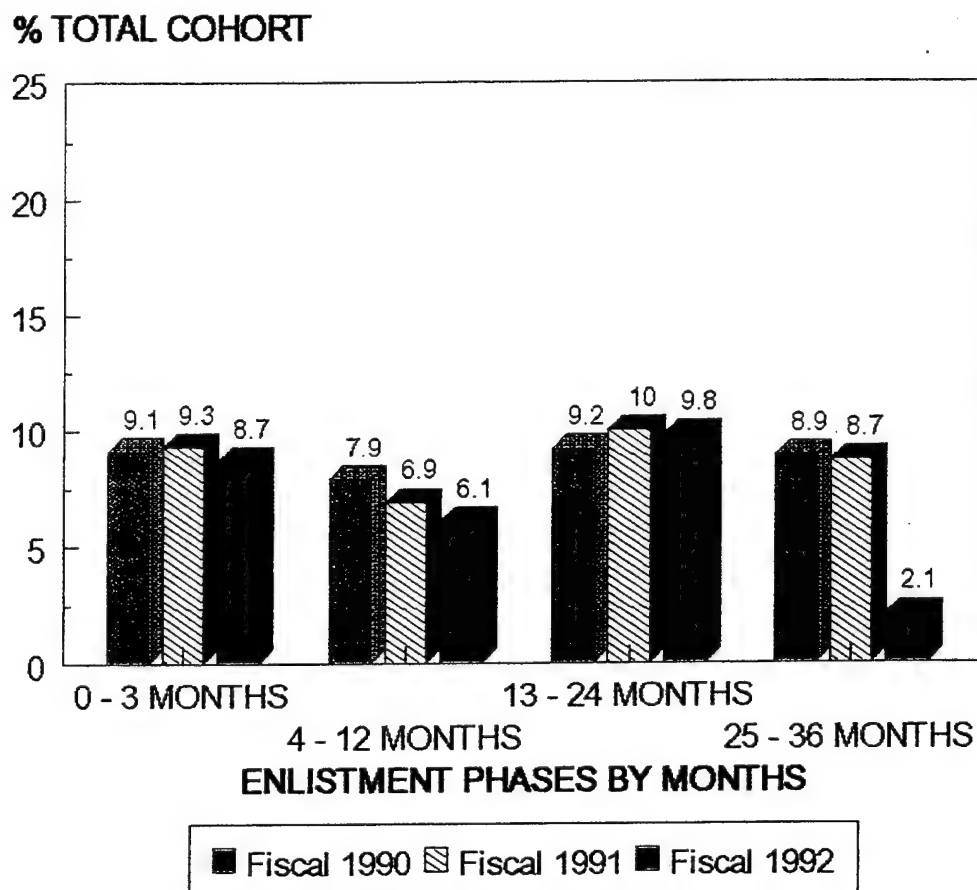
Source: Derived from data obtained from Defense Manpower Data Center.

Figure 4. 36-Month Attrition by Months, Fiscal 1990, 1991, and 1992 Cohorts

Table XIX and Figure 5 compare the reasons (ISCs) for attrition among enlistees in the 1990, 1991, and 1992 cohorts. As can be seen here, attrition for Legal and Fraud reasons decreased in fiscal 1992, while the catch-all category, "Other" reasons, increased. Psychiatric attrition remained constant at 16 percent, and Medical attrition decreased slightly by 1 percent.

Figure 5 presents the information in Table XXV in a bar graph, displaying the attrition rates for selected ISCs by the three cohort groups.

Table XIX. Interservice Separation Codes (ISCs) for 0 - 36 Months, Fiscal 1990, 1991 and 1992

ISC*	1990		1991		1992	
	PERCENT	NUMBER	PERCENT	NUMBER	PERCENT	NUMBER
MEDICAL	10.3	2083	11.1	1627	9.2	974
ADMINISTRATION/ MOTIVATION	.7	150	.7	96	.4	40
ENTRY LEVEL SEPARATION	2.7	545	3.2	467	6.5	637
CONVENIENCE OF THE GOVERNMENT	2.6	534	2.1	304	1.7	167
LEGAL	23.4	4740	20.9	3075	16.4	1598
DEATH	0	7	0	7	0	2
OTHERS OF INTEREST	1.4	291	2.1	305	2.9	284
FRAUD	16.8	3411	15.8	2314	12.7	1234
PSYCHIATRIC	14.6	2965	15.7	2305	16.6	1618
ALL OTHERS*	27.4	5569	28.5	4189	33.6	3166
TOTAL	100.0	20295	100.0	14689	100.0	9720

Source: Derived from data obtained from Defense Manpower Data Center.
*ISCs deleted from Sample: 001 = Expiration of Term of Service
                040 = Officer Commissioning Program
                041 = Warrant Officer Program
                042 = Service Academy
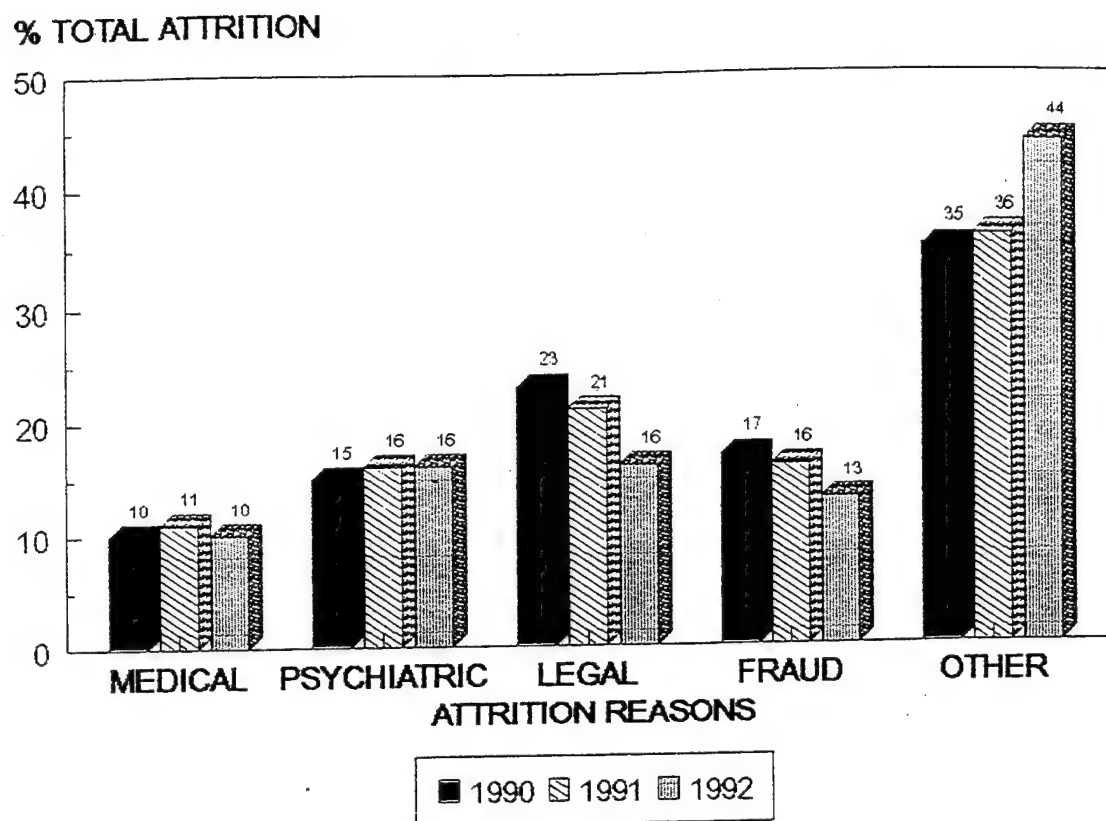
Figure 5. Attrition for Months 0-36, as Identified by ISCs,
Fiscal 1990, 1991, and 1992

V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

A. SUMMARY AND CONCLUSIONS

Examination of the fiscal 1992 cohort revealed a reduction of attrition among first-term sailors when compared with attrition data of both the fiscal 1990 and 1991 cohorts. These data support the hypothesis that N-AFMET has a positive impact on reducing first-term attrition. Further analysis delineated the reasons and timing of attrition. This information formed the basis for determining how N-AFMET impacted attrition. Finally, a logit multivariate regression analysis was used to identify variables most predictive of a sailor's propensity to attrite.

As seen below, the attrition rates for the fiscal 1992 cohort were generally lower (with one exception) than the rates for the 1990 and 1991 cohorts when examined by time period.

Period (Months of Service)	1992 Attrition Rate (Percent) Compared With:	
	1990 Cohort	1991 Cohort
0 through 3	.4 Lower	.6 Lower
4 through 12	1.8 Lower	.8 Lower
13 through 24	.6 Higher	.2 Lower
25 through 36	6.8 Lower	6.6 Lower

It should be noted, however, that only a portion of the fiscal 1992 cohort has accumulated greater than twenty-five months of service. Overall, the lower rates of attrition for the 1992 cohort tend to support the assumption that, holding all else constant, N-AFMET has contributed toward decreasing first-year attrition in the Navy.

As a general observation, the fraud category, which represents separations for alcoholism and drugs, declined over the three fiscal years: 1992 decreased 4 percent from 1990 and 3 percent from 1991. This result parallels the findings of Idar and

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Scaramozzino (1992) showing that 36 percent of the total number of recruits identified for separation by N-AFMET had some connection to an alcohol-or drug-related psychological diagnosis.

Psychiatric reasons for attrition among those who successfully completed Phase 1 but who attrited (Attrite 1), occurred primarily in the first twelve months of their enlistment. In the 32 percent who left the Navy in months 0-3, psychiatric reasons represented the second largest category of separations (5.3 percent). By comparison, in the 23 percent who left the Navy in months 4-12, psychiatric reasons represented the largest category (9.6 percent). For the remaining 45 percent who left the Navy in months 13-36, fraud (which includes the psychiatric disorders of alcoholism and drug abuse) was the second largest category (6.4 percent).

This thesis specifically examined sailors in the 1992 cohort who failed to complete their initial term of service. Three groups of sailors who attrited were singled out for study. These groups are based on the three N-AFMET phases in which the sailors were screened. The results of the study are summarized below.

ATTRITE 1

The Attrite 1 group includes personnel who successfully completed Phase 1 of N-AFMET but attrited. These sailors account for the largest proportion of the three attrition groups (25.5 percent of the total entering cohort). Demographic and multivariate logit regression analyses of the "average" Attrite 1 person are summarized in Table XX.

Table XX. Results of Demographic and Multivariate Regression Analyses by Selected Variables for Attrite 1

VARIABLE	DEMOGRAPHICS FOR ATTRITE 1	MULTIVARIATE REGRESSION PREDICTED VARIABLES
AGE (YEARS)	18-19	21-35*
GENDER	Male	Female*
MARITAL STATUS	Single	Single or Married*
DEPENDENTS	No dependents	1, 2, or 3 dependents*
EDUCATION	HS diploma	Alternative HS credential*
AFQT CATEGORY	II or IIIB	I, IIIA, or IIIB*
HOI (SCALES):		
ANTISOCIAL	Mean - 4.9 percent	Increases with score*
EMOTIONAL	Mean - 2.4 percent	None significant
RACE	White	Black or Asian**

Source: Derived from data obtained from Defense Manpower Data Center.
*Significant at the .01 level for increased attrition probability.
**Significant at the .01 level for decreased attrition probability.

It can be concluded that the significance of the HOI Antisocial scale score lends great credibility to Phase 1 of the N-AFMET screening process, since this test was designed to identify persons with antisocial behavior and problems of emotional instability. However, the analysis did not find the Emotional Instability scale to be significant. There are many differences between the demographics of the "average" Attrite 1 person and the significant regression variables: age, gender, dependents, education, and AFQT Category I, II, and IIIA. The demographics portray the average (or mean) descriptive variable, whereas the regression variables signify the probability of attrition, regardless of the size of the variable in the population (e.g., females in Attrite 1 who numbered 1611 or 17.4 percent).

ATTRITE 2

The Attrite 2 group includes personnel who successfully completed Phase 2 of N-AFMET but attrited. This group accounts for 61.1 percent of all the recruits sent to Phase 2 (.6 percent of the total entering cohort), where they took the NEO and the SRI. Demographic and multivariate logit regression analyses of the "average" Attrite 2 person are summarized in Table XXI.

Table XXI. Results of Demographic and Multivariate Regression Analyses by Selected Variables for Attrite 2

VARIABLE	DEMOGRAPHICS FOR ATTRITE 2	MULTIVARIATE REGRESSION PREDICTED VARIABLES
AGE (YEARS)	18-19	None significant
GENDER	Male	None significant
MARITAL STATUS	Single	None significant
DEPENDENTS	No dependents	None significant
EDUCATION	HS diploma	None significant
AFQT CATEGORY	II	None significant
HOI (SCALES):		
ANTISOCIAL	Mean – 9.45 percent	Increases with score*
EMOTIONAL	Mean – 3.99 percent	Decreases with score*
RACE	White	None significant

Source: Derived from data obtained from Defense Manpower Data Center.
*Significant at the .01 level for attrition probability.

The demographic variables for Attrite 2 are exactly the same as Attrite 1 except for the higher HOI mean scale scores, indicating a greater possibility of dysfunctional personal history. However, there are many differences between the demographics of the "average" Attrite 2 person and the significant regression variables. As in Attrite 1, the demographics portray the "average" or mean descriptive variable, whereas the regression variables predict the probability of attrition. Regression analysis found only two variables to be significant, the scores for the Antisocial Behavior scale and the scores for the Emotional Instability scale. Since 33.2 percent of the Attrite 2 group separated in months

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0-3 (Table VIII), it is not surprising to find the Antisocial scale score to be a significant variable. BMT training requires a recruit to work in teams to be successful. Antisocial behavior would contribute to an unsuccessful experience, most likely ending in attrition. However, it is unclear why a high score on the Emotional Instability scale decreases the probability of attrition.

ATTRITE 3

The Attrite 3 group includes personnel who successfully completed Phase 3 but attrited. This group accounts for 40 percent of all the recruits sent to Phase 3 (.6 percent of the total entering cohort), meaning they were interviewed by a clinician. Demographic and multivariate logit regression analyses of the "average" Attrite 3 person are summarized in Table XXII.

Table XXII. Results of Demographic and Multivariate Regression Analyses by Selected Variables for Attrite 3

VARIABLE	DEMOGRAPHICS FOR ATTRITE 3	MULTIVARIATE REGRESSION PREDICTED VARIABLES
AGE (YEARS)	18-19	21-35*
GENDER	Male	None significant
MARITAL STATUS	Single	None significant
DEPENDENTS	No dependents	None significant
EDUCATION	HS diploma	None significant
AFQT CATEGORY	II	None significant
HOI (SCALES):		
ANTISOCIAL	Mean - 9.45 percent	None significant
EMOTIONAL	Mean - 3.99 percent	None significant
NEO (SCORES):		
(N) male/female	Mean m-23.7/f-25.2	Male score only*
(A) male/female	Mean m-27.5/f-29.9	Male score only*
(C) male/female	Mean m-30.9/f-31.6	None significant
RACE	White	None significant

Source: Derived from data obtained from Defense Manpower Data Center.
*Significant at the .01 level for increased attrition probability.

The demographics for Attrite 3 resemble those of Attrite 1 and 2, except the HOI mean scores are higher (indicating a greater possibility of psychological illness) and the NEO scores are now included. The variables that make up the "average" Attrite 3 are again very different than the regression variables. The regression analysis found only three variables to be significant for increasing the probability of attrition: NEO scores (N and A) and older age. The significance of the high score on the NEO (N) and (A) lends credibility to the screening instrument for identifying sailors who may have problems adapting to the Navy due to difficulties in the domains of neuroticism and agreeability. Although the significance of being older does not correspond with the demographic profile of an Attrite 3, previous research (Buddin, 1989) found that persons in this age group often join the military after previous civilian job failures.

Comparison of Attrite 1 and Success 1 on Scales of the HOI

The current HOI cut-off score identified 1.8 percent of the entering fiscal 1992 cohort as having the greatest propensity to attrite due to a psychological disorder. However, the Attrite 1 group (25.6 percent of the Phase 1 recruits returned to duty) continued to attrite both in training and in the fleet, resulting in a considerable expenditure of time and money.

Because Attrite 1 represents such a large proportion of the fiscal 1992 cohort, their HOI scores are compared with those who succeeded after Phase 1 (Success 1), as described in Chapter IV. The multivariate analysis showed significance for HOI questions that related to both scales in the areas of emotional feelings, school successes, medical or physical problems, and reactions to authority. The scores for both Attrite 1 and Success 1 are listed below.

Emotional Instability -   Attrite 1   = .244

                              Success 1   = .192

Antisocial Behavior   -   Attrite 1   = .494

                              Success 1   = .403

It should be noted that the scores of Attrite 1 are greater than those of Success 1. The higher mean scores indicate a greater possibility of psychological problems for the Attrite 1 group. This finding suggests that decreasing the current HOI combined/weighted cut-off score may be warranted to better identify persons who will probably fail to complete their enlistment due to a psychological disorder.

The previous Attrite 1 multivariate analysis must also be considered here, in that only the Antisocial scale showed significance for increasing the probability of attrition. Further analysis should be conducted to determine if both scales or just one (the Antisocial Behavior scale) should be used in identifying which recruits proceed on to Phase 2. An additional discriminant analysis would define precisely what the "correct" score should be to identify the desired percentage of recruits.

B. RECOMMENDATIONS

Further analysis of the fiscal 1992 cohort is recommended to show complete attrition rates and reasons of separation for months 24-36 and months 37-48. This additional information will allow a more accurate comparison of attrition rates and reasons across the three fiscal years (1990, 1991, and 1992). Further statistical t-test analysis would analyze the reasons of separation for significance.

It would also be of benefit to track recruits who entered in fiscal 1993 and 1994. The HOI questions were reconstructed and expanded to seventy items in fiscal 1993, with the designation of a new cut-off score. Analysis should be conducted to determine the new test outcomes and to revalidate that the female bias was removed in the new version.

Another area that warrants further study involves the cost and benefits of N-AFMET. Specifically, a cost-tradeoff study could address the various costs involved in retaining psychologically-impaired personnel as opposed to the cost of separating them via N- AFMET. This could include, but is certainly not limited to, a cost analysis of medical interventions, social service consults, alcohol/drug rehabilitation, and administrative services versus the cost of the N-AFMET process. In addition, the study

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could assess less quantifiable costs of retaining these individuals, such as the possibly adverse effects on troop morale and readiness or individual performance.

These issues cannot be addressed by the present study, but they should be included in any future research concerning N-AFMET. The answers to these questions determine the actual impact of N-AFMET. It should be stressed that N-AFMET can only identify preservice conditions. In addition, there are many variables that account for personnel attrition in the Navy other than the psychological correlates identified by the N-AFMET three-phased screening process.

In summary, this thesis validated the original hypothesis, but only at a "macro" level. Nevertheless, it established the basis upon which to proceed with more in-depth analyses of the psychological screening process. The recruit of the 1990s is a complex person with multiple psychological dimensions. Attrition remains a significant concern for the Navy, as analysts and clinicians continue to improve the recruit screening process. Only through further analysis can the Navy's instruments for screening be refined to accurately predict the truly successful sailor.

APPENDIX: SUPPLEMENTAL DATA

TABLE A-1. Percentage Distribution of Selected Explanatory Variables for Attrite 1, Fiscal 1992 Cohort

SELECTED VARIABLES	TIME 1 0 - 3 MO PERCENT	NUMBER	TIME 2 4 - 12 MO PERCENT	NUMBER	TIME 3 13 - 24 MO PERCENT	NUMBER	TIME 4 25 - 35 MO PERCENT	NUMBER
AGE (YEARS)								
17	4.0	120	3.4	73	4.6	220	2.2	17
18-19	55.3	1666	56.8	1211	61.7	2932	54.2	˙423
20	14.9	449	14.9	318	13.7	649	15.1	118
21-35	25.8	778	24.9	531	20.0	952	28.5	222
RACE/ETHNICITY								
WHITE	72.1	2172	72.9	1554	66.6	3165	71.3	556
BLACK	16.0	482	14.7	314	17.8	48	16.8	131
ASIAN	1.3	43	1.5	31	2.0	96	2.1	16
HISPANIC	9.6	290	9.7	207	12.2	579	8.8	69
AFQT CATEGORY								
I	3.3	99	6.0	129	4.0	192	8.2	64
II	31.2	941	37.8	806	32.9	1565	41.8	326
IIIA	26.6	800	25.8	551	26.3	1250	24.7	193
IIIB	38.9	1173	30.1	643	36.4	1732	25.3	197
HIGHEST YEARS OF EDUCATION								
NO HS DIPLOMA	.7	20	.8	16	.7	31	.1	1
HS DIPLOMA	93.3	2812	92.5	1972	94.2	4476	94.7	739
ALTERNATIVE CRED	4.3	129	5.1	109	3.9	184	2.7	21
SOME COLLEGE	.7	22	.6	12	.5	25	.9	7
COLLEGE DEGREE	.9	28	1.1	24	.8	37	1.5	12
MARITAL STATUS/NUMBER OF DEPENDENTS								
SINGLE/0 DEP	88.4	1663	90.1	1921	92.5	4395	90.5	706
SINGLE/1 DEP	3.8	113	3.8	82	2.8	131	2.8	22
SINGLE/2 DEP	.3	10	.8	17	.7	31	.4	3
MARRIED/1 DEP	3.8	116	2.7	58	1.9	88	3.2	25
MARRIED/2 DEP	3.2	96	2.4	51	2.0	94	3.1	24
GENDER								
MALE	85.3	2570	81.9	1747	83.8	3983	79.0	616
FEMALE	14.7	443	18.1	386	16.2	770	21.0	164

Source: Derived from data obtained from Defense Manpower Data Center.

Table A-2. Logit Model Estimating the Probability of Attrition
Following Phase 1 (HOI) in Months 0-3, Fiscal 1992 Cohort

INDEPENDENT VARIABLES	COEFFICIENT ESTIMATE	CHANGE IN PROBABILITY
AGE (YEARS)		
17	.155 (2.28)	.02
20	.089 (2.33)	0
21 - 35	.226 (20.13)*	.01
RACE/ETHNICITY		
BLACK	-.209 (13.22)*	-.03
HISPANIC	-.132 (3.73)**	-.02
ASIAN	-.910 (31.91)*	-.10
TEST		
HOI: Emotional Instability	.114 (87.23)*	-.01
Antisocial Behavior	.101 (110.56)*	
AFQT CATEGORY		
IIIA	.283 (29.11)*	.03
IIIB	.590 (138.61)*	.06
I	-.244 (4.73)**	-.02
EDUCATION		
HIGH SCHOOL DIPLOMA	-.008 (.00)	0
ALTERNATIVE HS CREDENTIAL	.491 (8.80)*	.05
MARITAL STATUS/NUMBER OF DEPENDENTS		
SINGLE/1 DEPENDENT	.404 (13.28)*	.04
SINGLE/2 DEPENDENTS	-.231 (.47)	-.03
MARRIED/1 DEPENDENT	.469 (18.76)*	.04
MARRIED/2 DEPENDENTS	.393 (11.19)*	.03
RTC		
ORLANDO	-.660 (93.54)*	-.07
GREAT LAKES	-.065 (1.55)**	-.07
GENDER		
WOMEN	.481 (145.90)*	.05
INTERCEPT	-2.97 (420.99)*	.46
Chi-Square	1262.025	
Concordant Ratio***	68.3	
Sample Size	28131	

Source: Derived from data obtained from Defense Manpower Data Center.

Statistics in parentheses are Wald Chi-Square values.

*Significant at the .01 level.

**Significant at the .05 level.

***Is a measure of the predictive ability of the model.

Table A-3. Model Estimating the Probability of Attrition Following PHASE 1 (HOI) in Months 4-12, Fiscal 1992 Cohort

INDEPENDENT VARIABLES	COEFFICIENT ESTIMATE		CHANGE IN PROBABILITY
AGE (YEARS)			
17	-.090	(.50)	0
20	.036	(.29)	0
21 - 35	.076	(1.77)	0
RACE/ETHNICITY			
BLACK	-.267	(14.94)*	-.02
HISPANIC	-.119	(2.31)**	-.01
ASIAN	-.795	(18.20)*	-.06
TEST			
HOI: Emotional Instability	-.013	(.72)*	0
Antisocial Behavior	.116	(100.39)	.01
AFQT CATEGORY			
IIIA	.155	(6.90)	.01
IIIB	.283	(23.04)*	.02
I	-.025	(.06)	0
EDUCATION			
ALTERNATIVE HS CREDENTIAL	.808	(53.07)*	.06
MARITAL STATUS/NUMBER OF DEPENDENTS			
SINGLE/1 DEPENDENT	.524	(17.56)*	.04
SINGLE/2 DEPENDENTS	.646	(6.90)**	.05
MARRIED/1 DEPENDENT	.099	(.49)	0
MARRIED/2 DEPENDENTS	.062	(.17)	0
BASE			
ORLANDO	-.007	(.01)	0
GREAT LAKES	-.056	(.71)*	0
GENDER			
FEMALE	.386	(27.57)*	.03
INTERCEPT	-3.112	(1524.49)*	.22

Chi-Square	340.4129
Concordant Ratio***	60.4
Sample Size	27235

Source: Derived from data obtained from Defense Manpower Data Center.

Statistics in parentheses are Wald Chi-Square values.

*Significant at the .01 level.

** Significant at the .05 level.

*** Is a measure of the predictive ability of the model.

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Table A-4. Logit Model Estimating the Probability of Attrition Following Phase 1 (HOI) in Months 13-24, Fiscal 1992 Cohort

INDEPENDENT VARIABLES	COEFFICIENT ESTIMATE		CHANGE IN PROBABILITY
AGE (YEARS)			
17	.084	(.80)	.01
20	-.031	(.33)	0
21 - 35	-.009	(.04)	0
RACE/ETHNICITY			
BLACK	-.053	(1.05)	-.01
HISPANIC	.042	(.48)	0
ASIAN	-.607	(19.0)*	-.07
TEST			
HOI: Emotional Instability	-.060	(22.21)*	-.01
Antisocial Behavior	.126	(179.96)*	.01
AFQT CATEGORY			
IIIA	.243	(25.51)*	.03
IIIB	.569	(99.95)*	.06
1	-.202	(4.54)**	-.02
EDUCATION			
ALTERNATIVE HS CREDENTIAL	.559	(32.28)*	.06
MARITAL STATUS/NUMBER OF DEPENDENTS			
SINGLE/1 DEPENDENT	.246	(5.0) **	.03
SINGLE/2 DEPENDENTS	.679	(9.63)*	.07
MARRIED/1 DEPENDENT	-.220	(3.55)	-.02
MARRIED/2 DEPENDENTS	-.051	(.17)**	-.01
BASE			
ORLANDO	-.144	(5.77)*	-.02
GREAT LAKES	-.099	(3.62)**	-.01
GENDER			
FEMALE	.455	(56.72)*	.05
INTERCEPT	-2.59	(1672.51)*	.28
Chi-Square	519.812		
Concordant Ratio***	61.0%		
Sample Size	28549		

Source: Derived from data obtained From Defense Manpower Data Center.

Statistics in parentheses are Wald Chi-Square values.

*Significant at the .01 level.

**Significant at the .05 level.

***Is a measure of the predictive ability of the model.

Table A-5. Logit Model Estimating the Probability of Attrition Following Phase 1 (HOI) in Months 25-35, Fiscal 1992 Cohort

INDEPENDENT VARIABLES	COEFFICIENT ESTIMATE		CHANGE IN PROBABILITY
AGE (YEARS)			
17	.084	(.80)	-.01
20	-.031	(.33)	.01
21 - 35	-.009	(.04)	.01
RACE/ETHNICITY			
BLACK	-.053	(1.05)	0
HISPANIC	.042	(.48)	0
ASIAN	-.607	(19.00)*	-.02
TEST			
HOI: Emotional Instability	-.060	(22.21)*	0
Antisocial Behavior	.126	(179.96)*	0
AFQT CATEGORY			
IIIA	.243	(25.51)*	0
IIIB	.469	(99.95)*	0
I	-.202	(4.54)**	-.01
EDUCATION			
ALTERNATIVE HS CREDENTIAL	.559	(32.28)*	.01
MARITAL STATUS/NUMBER OF DEPENDENTS			
SINGLE/1 DEPENDENT	.247	(5.00)**	0
SINGLE/2 DEPENDENTS	.679	(9.63)*	0
MARRIED/1 DEPENDENT	-.051	(.17)	.01
MARRIED/2 DEPENDENTS	.082	(.44)	.01
BASE			
ORLANDO	-.144	(5.77)*	.02
GREAT LAKES	-.099	(3.63)**	0
GENDER			
FEMALE	.455	(56.72)*	.01
INTERCEPT	-2.595	(1672.51)*	.07
Chi-Square	519.812		
Concordant Ratio***	61.0%		
Sample Size	28549		

Source: Derived from data obtained from Defense Manpower Data Center.

Statistics in parentheses are Wald Chi-Square values.

*Significant at the .01 level.

**Significant at the .05 level.

***Is a measure of the predictive ability of the model.

Table A-6. Summary of Significant Variables for Phase 1 Attrition by Months of Service, Fiscal 1992 Cohort

INDEPENDENT VARIABLES*	MONTHS OF SERVICE			
	TIME 1 0-3	TIME 2 4-12	TIME 3 13-24	TIME 4 25-36
AGE				
YOUTH				
MATURE				
SENIOR	+			
RACE AND ETHNICITY				
BLACK	−	−		
ASIAN	−		−	−
HISPANIC		−		
TEST				
HOI: EMOTIONAL INSTABILITY	+		−	−
ANTISOCIAL BEHAVIOR	+	+	+	+
AFQT CATEGORY				
IIIA	+	+	+	+
IIIB	+	+	+	+
1	−		−	−
EDUCATION				
ALTERNATE HS DIPLOMA	+	+	+	+
MARITAL STATUS/NUMBER OF DEPENDENTS				
SINGLE/1 DEPENDENT	+	+	+	+
SINGLE/2 DEPENDENTS		+	+	+
MARRIED/1 DEPENDENT	+			
MARRIED/2 DEPENDENTS	+			
GENDER				
WOMEN	+	+	+	+
RTC				
ORLANDO	−		−	−
GREAT LAKES				

Source: Derived from data obtained from Defense Manpower Data Center.

*All variables noted with +/- are significant at the .01 level.

Sign of "+" denotes increased probability of attrition, "-" denotes decreased probability of attrition.

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